12-ORA-SR-55
PM R6.29 to PM R10.32
EA 0J340K
September 2008

PROJECT STUDY REPORT
(Project Development Support)

To

Request Programming for Capital Support
(Project Approval and Environmental Document Phase)

In the 2009/2010 STIP

On State Route 55 from PM 6.29 to PM 10.32 Between I-405 and I-5 in Orange County

SUBMITTED BY:

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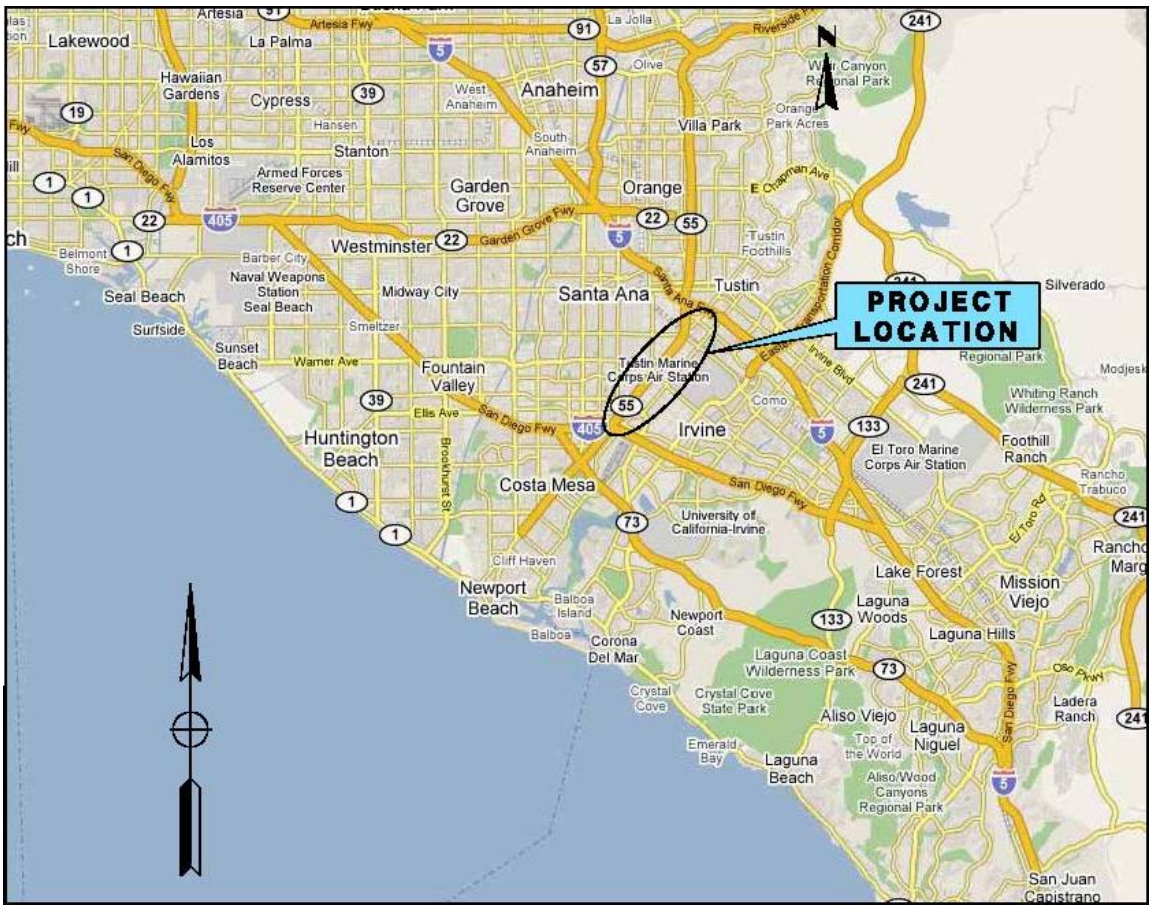

On State Route 55 from PM 6.29 to PM 10.32
Between I-405 and I-5 in Orange County

12-ORA-SR-55
PM R6.29 to PM R10.32
EA 0J340K

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.

Shohreh Nourmohammadian 9-23-08

Shohreh Nourmohammadian *DATE*
REGISTERED CIVIL ENGINEER

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- **Storm Water Data Report (SWDR)**
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SR-55 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 State Route 55 (SR-55) from post mile 6.29 (north of Interstate 405 [I-405] connectors) to post mile 10.32 (south of Interstate 5 [I-5] connectors). The project is located in the cities of Santa Ana, Irvine, and Tustin and in the County of Orange. The project location map is presented in EXHIBIT A.

Six alternatives (including No-Build as the Baseline Alternative) have been prepared for project analysis, to improve traffic operations, and increased freeway capacity for the ultimate improvement for the SR-55 study area as shown in schematic EXHIBIT B.

The alternatives being analyzed are summarized below:

- **No-Build - Baseline Alternative** – The no-build alternative includes the construction of the auxiliary lanes, which were analyzed individually by Caltrans and others in the Project Study Reports (PSRs) for southbound (SB) auxiliary lanes from Edinger Avenue (Ave.) to Dyer Road (Rd.) [EA 12-0G960K], SB Aux lane from Dyer Rd. to MacArthur Boulevard (Blvd.) [EA 12-0E2500], Alton Ave. Overcrossing (OC) and High Occupancy Vehicles (HOV) drop ramps [EA12-005500], and SR-55 continuous HOV access from Paularino Ave. to Meats Ave. [EA12-0J760K]. These four previously proposed improvements are assumed to be in place under the "No-Build Baseline" Alternative.

- **Alternative 1 (Auxiliary Only)** – This alternative adds one auxiliary lane in both directions and provides full freeway standard features. The estimated capital construction cost is $71.09 million and the right-of-way cost is $32.24 million. See EXHIBITS D and E for typical cross sections, and key map and layouts for this alternative.

- **Alternative 2 (1 GP Only) -** This alternative adds a fifth general purpose (GP) lane in both directions in lieu of the auxiliary lanes. The estimated capital construction cost is $87.83 million and the right-of-way cost is $39.66 million. See EXHIBITS D and F for typical cross sections, and key map and layouts for this alternative.

- **Alternative 3 (Auxiliary + 1 GP) –**This alternative combines Alternative 1 and Alternative 2 to provide an auxiliary lane and GP lane in both directions. The estimated capital construction cost is $137.12 million and the right-of-way cost is $72.51 million. See EXHIBITS D and G for typical cross sections, and key map and layouts for this alternative.

- **Alternative 4 (Auxiliary + 1 GP + HOV) –**This alternative combines Alternatives 1 and 2 and adds a HOV lane. This alternative has been rejected from further study due to the high right-of-way impact. See EXHIBITS D and H for typical cross sections, and key map and layouts for this alternative.

- **Alternative 5 (Auxiliary + HOV) –** This alternative combines Alternative 1 and adds a new HOV lane to increase capacity of the existing HOV lane. The estimated capital construction cost is $125.48 million and the right-of-way cost is $54.47 million. See EXHIBITS D and I for typical cross sections, and key map and layouts for this alternative.

This project is primarily funded by OCTA with the Renewed Measure M local sales tax and is proposed to be programmed in the 2009/2010 State Transportation Improvement Program (STIP) for construction to begin in 2013 and be completed in 2015.

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. The project is classified as Category 4A as described in Chapter 8 of the Project Development Procedure Manual.

2. BACKGROUND

The Costa Mesa Freeway, SR-55, represents a major link to other freeway systems within Orange County and is a vital component of the County's transportation system (see Figure 1, Regional Location Map). It is the only freeway in the County providing a direct north-south connection between central Orange County and the coastal region from Costa Mesa to Los Angeles County.

SR-55 is one of the most heavily congested freeways in Southern California. Normal morning delays begin at 5:00 AM and continue through 9:00 AM, while afternoon delays generally extend from 3:00 PM to 7:00 PM. Currently, SR-55 has four GP lanes and one HOV lane in each direction and it carries approximately 276,000 annual average daily traffic (AADT) operating at a level of service (LOS) F during peak hours. This is based on annual average daily traffic (AADT) published by Caltrans.

SR-55 provides north-south access in Orange County from State Route 91 (SR-91) to 19th Street in Costa Mesa and becomes a conventional highway, Newport Boulevard, between 19th Street and Pacific Coast Highway (SR-1) in Newport Beach. SR-55 is the only major freeway corridor for commerce and daily commuters connecting between SR-91 and SR-1 with freeway-to-freeway interchanges to State Route 22 (SR-22), I-5 and I-405 freeways. It is also the main route to beaches and tourist attractions in the County's coastal communities.

SR-55 was originally constructed in 1962 as a four-lane freeway. In 1970, two traffic lanes were added to SR-55. In 1985, Orange County's first HOV lanes were added on this route between I-405 and SR-91. In 1990, the freeway was extended to 19th Street in the city of Costa Mesa. In late 1995, the County's first direct HOV/transit-way connector opened at the I-5/SR-55 interchange. In early 2005, the completion of the HOV direct connectors at the I-405/SR-55 interchange increased traffic volumes on northbound (NB) SR-55.

Currently, SR-55 has four GP lanes and one HOV lane in each direction. The existing freeway configuration is shown in EXHIBIT B under "Baseline" or existing condition. The existing auxiliary lanes in the NB direction are from the NB I-405 connector to MacArthur Blvd., from MacArthur Blvd. to Dyer Rd. (EA005500), and from Edinger Ave. to McFadden Ave. The existing auxiliary lanes in the SB direction are from the SB I-5 connectors to McFadden Ave., from McFadden Ave. to Edinger Ave., from Edinger Ave. to Dyer Rd. (EA 0G960K), from Dyer Rd. to MacArthur Blvd. (EA 0E2500), and from MacArthur Blvd. to the SB I-405 connectors.

2.1 PREVIOUS AND ON-GOING PROJECT REPORTS WITHIN THE PROJECT LIMIT

Currently, several segments within the SR-55 corridor, as listed below, have been formally studied and will be under final design for construction in the future:

1. **Approved PSR (EA 0G960K):** This project adds a new SB auxiliary lane from Edinger Ave. to Dyer Rd. This Project Initiation Document, (PID) was prepared and approved by Caltrans in 2005.

2. **Approved PSR (EA 0E2500):** This project adds a new SB auxiliary lane from Dyer Rd. to MacArthur Blvd. The PID was prepared and approved in 2000.

3. **Approved Project Report/Environmental Document (PA/ED - EA 005500):** This project adds a new OC at Alton Ave. and new HOV drop ramps in the cities of Santa Ana and Irvine. This Project Report was prepared by the cities of Santa Ana and Irvine and approved by Caltrans in 2006. It is planned to be constructed in the future by the cities of Santa Ana and Irvine in partnership with Caltrans and OCTA.

4. **Approved PSR (EA 0G260K):** This project was identified as part of the freeway choke point program. The project is located at I-5/SR-55 and improves traffic congestion as an interim operational improvement. This PID was prepared by OCTA and approved by Caltrans in 2005. However, a future study is programmed to be implemented by OCTA between the SR55/I-5 to the SR-22/SR-55 interchanges under Renewed Measure M programs as Project “A”.

5. **Approved PSR (EA 0G950K):** This project adds a new 12’ wide NB auxiliary lane from Dyer Rd. to Edinger Ave. This PID was prepared and approved by Caltrans in 2005.

6. **Approved PSR (EA 0J760K):** This project provides continuous HOV access and standard GP lanes and shoulders by removing the existing HOV buffer and restriping SR-55 from Paularino Ave. to 0.10 mile north of the Meats Ave. OC. This PID was approved by Caltrans in 2008, and is pending approval by FHWA.

7. **PSR/PR (EA 0H290K):** This project provides additional freeway ramp storage for the traffic volumes from eastbound (EB) MacArthur Blvd to NB and SB SR-55. This PID is under study by the city of Santa Ana.

3. PURPOSE AND NEED STATEMENT

Need: The project study area currently operates at LOS E or F during peak periods. The most significant key factors/issues are:

1. Limited GP lane capacity on SR-55;
2. Inadequate merging distances along the freeway due to the close proximity of on/off-ramps along the mainline; and
3. Non-standard lane and shoulder widths at various locations.

Future traffic demand is anticipated to increase traffic volumes to levels which will increase traffic congestion, increase travel delays, and reduce travel speeds. The existing (2007) mainline LOS are shown in Table 1. As indicated in the table, the majority of the segments on SR-55 within the study area are currently operating at LOS E or F, which are considered unacceptable. The weaving segments in both directions of SR-55 are operating at an unacceptable LOS because of the limited and inadequate spacing between the interchanges.

Table 1: Existing (2007) – Basic Freeway Segment Analysis

Mainline Segment	Lanes	AM Peak	PM Peak
		LOS	LOS
NB I-405 to MacArthur Blvd.	4	D	C
NB MacArthur Blvd. to Dyer Rd.	4	**E**	D
NB Dyer Rd. to Edinger Ave.,	4	**E**	**E**
NB Edinger Ave.. to McFadden Ave..	5	D	**E**
NB McFadden Ave.. to I-5	5	C	D
SB I-5 to McFadden Ave..	4	D	D
SB McFadden Ave.. to Edinger Ave.	4	**F**	**E**
SB Edinger Ave. to Grand Ave.	4	**F**	**E**
SB Grand Ave. to Dyer Rd.	4	**E**	**E**
SB Dyer Rd. to MacArthur Blvd.	4	**E**	**E**
SB MacArthur Blvd. to I-405	4	C	D

Notes:
Shaded cells indicate LOS E or F

Traffic volumes are expected to increase greatly by 2035 (See Section 4.1.2 Traffic Volumes). It is anticipated that without additional major capital improvements, the LOS for the entire study area in the NB and SB directions would be unacceptable during AM and PM peak periods, with the exception of two segments. Those segments are: NB Edinger Ave. to McFadden Ave. during AM peak and NB I-405 to MacArthur Blvd. during PM peak, both of which would operate at LOS D.

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

Purpose: The purpose of this project is to provide congestion relief and improve traffic flow on SR-55 from south of I-5 to I-405. The objectives of this project are as follows:

1. Improve mobility and reduce congestion;
2. Improve traffic operations;
3. Increase Capacity; and
4. Improve and incorporate up-to-date technological traffic control measures.

4. DEFICIENCIES

4.1 PRIMARY DEFICIENCIES

The SR-55 project corridor between I-5 and MacArthur Blvd. 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 (2035) 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 SR-55 corridor, including limited mainline capacity and short merging distances at the on- and off-ramps. This project will analyze the design year (2035) traffic impacts associated with the No-Build Alternative and five (5) Build Alternatives that will address the existing and future deficiencies along the SR-55 corridor.

4.1.1 Existing (2007) Traffic Conditions

Existing SR-55 within the project limits varies between four and five lanes with one or two HOV lanes, and auxiliary lanes in some locations between on- and off-ramps.

4.1.2 Existing (2007) Traffic Volumes

Existing traffic counts (ADT and peak hour intersection turning movements) were collected in 2007 from Caltrans, Freeway Performance Measurement System (PeMS), OCTA and the cities of Santa Ana, Tustin and Irvine along the corridor. **Table 2** presents the SR-55 daily and AM/PM peak hour mainline and HOV volumes collected from Caltrans and PeMS. The ADT and peak hour volumes (AM and PM) are separated by NB and SB SR-55 sections. The highest peak hour volumes from either the Caltrans or PeMS data were selected from each of the AM peak period and the PM peak periods. The table identifies the Post Mile location of the count, the detector number (VDS), description of the count location, number of lanes and count data for both the mainline lanes and HOV lanes, along with the source of the data. Additional verification of the selected peak hour volumes was conducted to ensure that the loop data was the most accurate available by reviewing the speed, occupancy, and overall detector health at each location. The Traffic Report (tables in Appendix B) contains additional information on the detector health.

Further review of the existing data identified the need to also collect the peak flow for the entire day since the peak hour volumes occur during significantly congested periods along this portion of SR-55 and the speed associated with the peak hour volume was lower than 55 miles per hour, which is the lower threshold for conducting Highway Capacity Manual (HCM) analysis. An additional column is provided in **Table 2** that includes the highest mainline peak hour volume of the day along with the corresponding speed that's used in the analysis later in this section.

Table 2: Existing (2007) – Mainline and HOV Volumes

SR-55 NB 2007 Freeway Weekday (Tuesday-Thursday) Volume

			ML				High Pk Hr	HOV				
PM	*VDS*	*Description*	*Lane*	*ADT*	*AM PH*	*PM PH*	*Vol/Speed*	*Lane*	*ADT*	*AM PH*	*PM PH*	*Source*[1]
6.10	1214373	N of 405	4	89,290	7,130	3,880	N/A	0	--	--	--	Caltrans
6.35	1214321	Main	5	122,135	9,315	5,665	N/A	0	--	--	--	Caltrans
6.94	1203124	MacArthur 1	4	100,415	7,715	4,535	7681/57	1	3,510	220	360	PeMS
7.10	1203148	MacArthur 2	4	107,120	7,575	5,215	8052/68	1	8,169	515	950	PeMS
7.85	1203172	Dyer 1	4	109,425	7,070	5,955	7076/56	1	14,344	680	1,450	PeMS
8.12	1203184	Dyer 2	4	119,920	8,085	6,615	8097/63	1	12,855	775	1,420	PeMS
8.60	1214253	Warner	4	128,840	7,750	7,285	N/A	1	19,293	765	1,785	Caltrans
9.19	1211173	Edinger 1	4	116,650	7,045	6,990	7160/60	1	16,074	1,660	1,125	PeMS
9.41	1203221	Edinger 2	4	118,585	7,340	7,260	7473/61	1	17,091	765	1,830	PeMS
9.84	1203254	McFadden	5	130,580	7,850	8,370	8338/64	1	17,569	770	1,875	PeMS
10.20	1209860	N of I-5	4	88,145	5,020	6,255	6144/60	1	7,969	315	960	PeMS
10.40	1209873	S of I-5	3	75,650	4,280	5,645	5574/63	1	8,374	280	1,085	PeMS
10.50	1209888	N of I-5	3	74,730	4,220	5,610	5558/64	1	9,224	325	1,115	PeMS

SR-55 SB 2007 Freeway Weekday (Tuesday-Thursday) Volume

			ML				High Pk Hr	HOV				
PM	*VDS*	*Description*	*Lane*	*ADT*	*AM PH*	*PM PH*	*Vol/Speed*	*Lane*	*ADT*	*AM PH*	*PM PH*	*Source*[1]
6.35	1214322	Main	4	98,550	5,400	7,090	7816/72	0	--	--	--	Caltrans
6.88	1203110	MacArthur 1	4	116,080	6,855	8,175	N/A	2	19,002	1,285	1,090	Caltrans
7.03	1203136	MacArthur 2	4	111,655	6,765	7,525	7595/64	2	12,697	1,175	975	PeMS
7.62	1203161	Dyer 1	4	125,975	7,650	7,525	7704/58	1	24,913	1,575	1,380	PeMS
8.12	1203188	Dyer 2	4	122,550	7,820	7,400	7833/56	1	15,897	1,620	1,140	PeMS
8.60	1214215	Warner	4	124,315	7,920	7,355	N/A	1	20,606	1,570	1,480	Caltrans
9.19	1203206	Edinger 1	4	125,520	8,110	7,325	8248/69	1	16,624	770	1,765	PeMS
9.84	1203239	McFadden	4	127,790	8,275	7,460	7860/55	1	17,854	1,850	1,155	PeMS
10.40	1203266	S of I-5	4	113,505	6,420	6,300	6438/61	1	10,837	1,295	710	PeMS
10.50	1203271	N of I-5	3	66,555	5,025	4,310	5004/65	1	8,975	1,345	505	PeMS

Notes:

1. Count data provided by either PeMS or Caltrans for various periods in year 2007; the highest volumes for each station is used.

ML = Mainline Lanes HOV = High Occupancy Vehicle

N/A – Not Available

Table 3 presents the ramp volumes (ADT and AM/PM peak hour) along SR-55 within the study area. Similar to Table 2, the Post Mile, VDS number, ramp description, on-or off-ramp designation, and the data source are identified along with the ADT and peak hour ramp volumes. Existing turning movement counts collected from the local agencies were primarily from 2007. However, existing counts older than 2007 were increased by one percent per year compounded annually. Additionally, new peak hour intersection turning movement counts were collected in October 2007 at the intersections of Village Way/SR-55 SB ramps, Grand Ave. and SR-55 SB off-ramp, and SR-55 SB ramps/Hotel Terrace Dr. and Dyer Rd. since existing data was unavailable.

Table 3: Existing (2007) – Ramp Volumes

SR-55 NB Ramps Weekday (Tu-Thur)

PM	*VDS*	*Description*	*Ramp*	*ADT*	*Source*[1]	*AM PH*	*Source*[1]	*PM PH*	*Source*[1]
6.94	1203116	MacArthur 1	ON	9,535	PeMS	560	PeMS	700	PeMS
	1203120	MacArthur 1	OFF	16,510	PeMS	1,670	PeMS	1,065	PeMS
7.16	1203141	MacArthur 2	ON	8,670	PeMS	220	PeMS	1,045	PeMS
7.85	1213746	Dyer 1	OFF	10,500	PeMS	1,355	Caltrans	335	PeMS
	1203166	Dyer 1	ON	8,747	Caltrans	595	PeMS	710	PeMS
8.12	1203177	Dyer 2	ON	7,730	PeMS	305	PeMS	1,055	PeMS
9.41	1203212	Edinger 2	ON	11,610	PeMS	590	PeMS	955	PeMS
	1203217	Edinger 2	OFF	5,810	PeMS	555	PeMS	220	PeMS
10	1203250	McFadden	OFF	4,820	PeMS	260	PeMS	245	PeMS
	1203245	McFadden	ON	12,010	PeMS	865	PeMS	990	PeMS
10.2	1209862	N55 - N5	FF	53,450	PeMS	3,625	PeMS	3,100	PeMS
10.4	1203262	N55 - S5	FF	12,695	PeMS	885	PeMS	560	PeMS
10.5	1209893	N of 5 -1	OFF	3,060	PeMS	290	PeMS	160	PeMS
	1209892	N of 5	OFF	6,420	PeMS	575	PeMS	385	PeMS
	1209891	N5 - N55	FF	36,580	PeMS	1,920	PeMS	2,620	PeMS

SR-55 SB Ramps Weekday (Tu-Thur)

PM	*VDS*	*Description*	*Ramp*	*ADT*	*Source*[1]	*AM PH*	*Source*[1]	*PM PH*	*Source*[1]
30.4	1209013	N5 to S55	FF	13,710	PeMS	910	Caltrans	605	PeMS
10.4	1209875	S5 to S55	FF	55,940	PeMS	3,090	PeMS	3,365	PeMS
10	1203232	McFadden	OFF	7,690	PeMS	305	PeMS	505	PeMS
	1203227	McFadden	ON	7,350	PeMS	775	PeMS	430	PeMS
9.19	1203202	Edinger1	OFF	10,230	PeMS	865	PeMS	610	PeMS
	1203197	Edinger1	ON	6,535	PeMS	475	PeMS	490	PeMS
8.12	1203193	Dyer 2	OFF	10,791	Caltrans	850	Caltrans	655	PeMS
7.62	1213749	Dyer 1	OFF	7,675	PeMS	815	PeMS	390	PeMS
	1203154	Dyer 1	ON	13,305	PeMS	820	PeMS	1,205	PeMS
7.03	1213916	MacArthur 2	OFF	18,345	PeMS	1,575	PeMS	975	PeMS
	1203130	MacArthur 2	ON	5,654	Caltrans	165	Caltrans	700	PeMS
6.88	1203104	MacArthur 1	ON	10,545	Caltrans	765	Caltrans	970	PeMS

Notes:

1. Count data are provided by either PeMS or Caltrans; the highest volumes for each station are used for the study. Caltrans data are dated 7/17-7/19/2007, PeMS data are dated 4/3-4/5/2007.

4.1.3 Freeway Operations Analysis for 2007 and No-Build for 2035

Travel speeds associated with the AM and PM peak hour volumes are often less than 55 miles per hour (mph), which is the minimum threshold value in the Highway Capacity Software, (HCS) analysis. The speed data in the SB direction during both the AM and PM peak hours consistently fall below the 55 mph threshold and resulted in unacceptable LOS E and F conditions. Therefore, the peak hour volume of the day associated with the highest density (vehicles per mile) was identified to be the most appropriate volume to use in the analysis. **Table 4** summarizes the density and LOS results of the analysis performed for the basic freeway segment locations along SR-55 between I-5 and I-405 under the existing (2007) conditions. The mainline lanes are also provided in the table and a 0.9 peak hour factor was used in the analysis along with the truck percentages (ranging between 2-8 percent) identified for each segment.

Table 4: Existing (2007) – Basic Freeway Segment Analysis

Mainline Segment	Lanes	Peak Hour of the Day	
		Den.	LOS
NB I-405 to MacArthur Blvd.	4	**39.3**	**E**
NB MacArthur Blvd. to Dyer Rd.	4	**41.4**	**E**
NB Dyer Rd. to Edinger Ave,	4	**44.4**	**E**
NB Edinger Ave. to McFadden Ave.	5	30.8	D
NB McFadden Ave. to I-5	5	29.4	D
SB I-5 to McFadden Ave.	4	30.7	D
SB McFadden Ave. to Edinger Ave.	4	**---**	**F**
SB Edinger Ave. to Grand Ave.	4	**44.0**	**E**
SB Grand Ave. to Dyer Rd.	4	**44.6**	**E**
SB Dyer Rd. to MacArthur Blvd.	4	**42.2**	**E**
SB MacArthur Blvd. to I-405	4	**38.0**	**E**

Notes:
Shaded cells indicate LOS E or F.
Den. = Density in passenger car equivalents per mile per lane.

Table 5 summarizes the density and LOS results of the analysis performed for the basic freeway segment locations along SR-55 between I-5 and I-405 under the design year (2035) No-Build conditions. The mainline lanes are also provided in the table, and a 0.9 peak hour factor was used in the analysis along with the truck percentages (6 percent NB and 7 percent SB) for each segment.

Table 5: Design Year (2035) No-Build – Basic Freeway Segment Analysis

Mainline Segment	Lanes	AM Peak		PM Peak	
		Den.	LOS	Den.	LOS
NB I-405 to MacArthur Blvd.	4	---	F	34.8	D
NB MacArthur Blvd. to Dyer Rd.	4	---	F	**44.2**	**E**
NB Dyer Rd. to Edinger Ave,	4	---	F	---	F
NB Edinger Ave. to McFadden Ave.	5	29.7	D	**41.4**	**E**
NB McFadden Ave. to I-5	5	**35.2**	**E**	---	F
SB I-5 to McFadden Ave.	4	---	F	---	F
SB McFadden Ave. to Edinger Ave.	4	---	F	---	F
SB Edinger Ave. to Grand Ave.	4	---	F	---	F
SB Grand Ave. to Dyer Rd.	4	---	F	**41.7**	**E**
SB Dyer Rd. to MacArthur Blvd.	4	---	F	---	F
SB MacArthur Blvd. to I-405	4	---	F	---	F

Notes:
Shaded cells indicate LOS E or F.
Den. = Density in passenger car equivalents per mile per lane.

4.1.4 Ramp Junction Analysis for 2007 and No-Build for 2035

Table 6 presents the density and LOS results for the ramp junctions along SR-55 within the study corridor. Similar to the LOS results presented for the basic freeway segments, the peak hour speeds in many cases are significantly lower than the lower threshold of 55 mph during the severely congested conditions. As can be seen in the table below, this would result in unacceptable LOS E or F conditions at every ramp junction in at least one peak hour scenario.

Table 6: Existing (2007) – Ramp Junction Analysis

Ramp Junction	NB SR-55				SB SR-55			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Den.	LOS	Den.	LOS	Den.	LOS	Den.	LOS
MacArthur Blvd. Off-Ramp	**23.4**	**F**	9.9	A	**49.6**	**F**	**47.3**	**F**
MacArthur Blvd. EB On-Ramp	**19.5**	**F**	16.0	B	23.2	C	**32.2**	**F**
MacArthur Blvd. WB On-Ramp	19.9	B	17.4	B	18.6	B	**19.3**	**F**
Dyer Rd. Off-Ramp	**45.2**	**F**	33.0	D	**42.5**	**F**	**38.3**	**E**
Dyer Rd. EB On-Ramp	18.8	B	17.6	B	**19.3**	**F**	**18.7**	**F**
Dyer Rd. WB On-Ramp	**20.6**	**F**	18.3	B	N/A	N/A	N/A	N/A
Grand Ave. Off-Ramp	N/A	N/A	N/A	N/A	**43.1**	**F**	**39.6**	**E**
Edinger Ave. Off-Ramp	**37.6**	**E**	**35.5**	**E**	**40.1**	**F**	**35.1**	**E**
Edinger Ave. On-Ramp	Weave Segment				Weave Segment			
McFadden Off-Ramp					Weave Segment			
McFadden On-Ramp	Weave Segment				Weave Segment			
I-5 NB Off-Ramp					N/A	N/A	N/A	N/A
I-5 SB Off-Ramp					N/A	N/A	N/A	N/A
I-5 SB On-Ramp	N/A	N/A	N/A	N/A	Weave Segment			
I-5 NB On-Ramp	N/A	N/A	N/A	N/A	**39.2**	**F**	32.9	D

Notes:
Shaded cells indicate LOS E or F.
Den. = Density in passenger car equivalents per mile per lane.
N/A = Not Applicable.

Table 7 presents the density and LOS results for the ramp junctions along SR-55 within the study corridor. The table separates NB and SB results for each ramp junction. There are several sections along SR-55 where an on-ramp junction connects with a downstream off-ramp junction, known as an auxiliary lane. At locations where the auxiliary lane between the two ramp junctions exceeds 2,500 feet in length, the ramp junction analysis is provided. When the auxiliary lane length is less than 2,500 feet in length, the Highway Capacity Manual (HCM) defines this situation as a weave segment. These segments are identified in Table 15 and discussed later in this section.

The LOS results for the No-Build Alternative indicate that each ramp junction is projected to operate at an unacceptable LOS E or F condition in at least one peak hour.

Table 7: Design Year (2035) No-Build – Ramp Junction Analysis

Ramp Junction	NB SR-55				SB SR-55			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Den.	LOS	Den.	LOS	Den.	LOS	Den.	LOS
I-405 On-Ramp	Weave Section				Weave Section			
MacArthur Blvd. Off-Ramp					Weave Section			
MacArthur Blvd. EB On-Ramp	**30.2**	**F**	24.7	C	Weave Section			
MacArthur Blvd. WB On-Ramp	**33.2**	**F**	26.6	C	28.2	D	**28.7**	**F**
Dyer Rd. Off-Ramp	**51.0**	**F**	**39.0**	**E**	**48.6**	**F**	**39.2**	**E**
Dyer Rd. EB On-Ramp	28.3	D	**27.5**	**F**	Weave Section			
Dyer Rd. WB On-Ramp	**30.5**	**F**	**28.7**	**F**	N/A	N/A	N/A	N/A
Grand Ave. Off-Ramp	N/A	N/A	N/A	N/A	**51.4**	**F**	**43.0**	**F**
Edinger Ave. Off-Ramp	**44.1**	**F**	**50.4**	**F**	Weave Section			
Edinger Ave. On-Ramp	Weave Section				**33.8**	**F**	**28.5**	**F**
McFadden Off-Ramp					Weave Section			
McFadden On-Ramp	Weave Section				Weave Section			
I-5 NB Off-Ramp					N/A	N/A	N/A	N/A
I-5 SB Off-Ramp					N/A	N/A	N/A	N/A
I-5 SB On-Ramp	N/A	N/A	N/A	N/A	Weave Section			
I-5 NB On-Ramp	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
Shaded cells indicate LOS E or F.
Den. = Density in passenger car equivalents per mile per lane.
N/A = Not Applicable.

4.1.5 Weaving Analysis for 2007 and No-Build for 2035

The existing weaving sections are identified in **Table 8** below along with the type of weaving section, the number of lanes, and the AM/PM density and LOS results. Most of the existing weaving sections operate at an unacceptable LOS F during the AM and PM peak hours.

Table 8: Existing (2007) – Weaving Section Analysis

Weaving Segment	Type	Lanes	AM Peak		PM Peak	
			Den.	LOS	Den.	LOS
NB Edinger Ave. On to McFadden Ave. Off	B	5	30.4	D	32.8	D
NB McFadden Ave. On to I-5 NB Off	B	5	**51.1**	**F**	**56.3**	**F**
NB McFadden Ave. On to I-5 SB Off	C	5	22.6	C	29.8	D
SB I-5 SB On to McFadden Ave. Off	A	5	**68.5**	**F**	**63.1**	**F**
SB McFadden Ave. On to Edinger Ave. Off	A	5	**63.1**	**F**	**50.8**	**F**

Notes:
Shaded cells indicate LOS E or F.
Den. = Density in passenger car equivalents per mile per lane.

The weaving sections are identified in **Table 9** below along with the type of weaving section, the number of lanes, and the AM/PM density and LOS results. All of the SB weaving segments and most of the NB weave segments are projected to operate at an unacceptable LOS E or F during at least one of the AM/PM peak hours. The only exception is the NB weave segment between the McFadden Ave. on-ramp and the second freeway connector to I-5 SB.

Table 9: Design Year (2035) No-Build – Weaving Section Analysis

Weaving Section	Type	Lanes	AM Peak		PM Peak	
			Den.	LOS	Den.	LOS
NB I-405 On to MacArthur Blvd. Off	B	5	**39.9**	**E**	29.0	D
NB Edinger Ave. On to McFadden Ave. Off	B	5	30.5	D	**35.9**	**E**
NB McFadden Ave. On to I-5 NB Off	B	5	**50.3**	**F**	**50.3**	**F**
NB McFadden Ave. On to I-5 SB Off	C	5	20.0	C	20.0	C
SB SR-55 SB to McFadden Ave. Off	C	5	**52.7**	**F**	**48.7**	**F**
SB I-5 SB On to McFadden Ave. Off	A	5	**53.3**	**F**	**49.6**	**F**
SB McFadden Ave. On to Edinger Ave. Off	A	5	**52.0**	**F**	**39.6**	**E**
SB Dyer Rd. On to MacArthur Blvd. Off	A	5	**---**	**F**	**---**	**E**
SB MacArthur Blvd. On to SB I-405 Off	B	5	**38.1**	**E**	**39.9**	**E**

Notes:
Shaded cells indicate LOS E or F.
Den. = Density in passenger car equivalents per mile per lane.

4.1.6 Intersection LOS for 2007 and No-Build for 2035

The existing intersection turning movement volumes for the AM and PM peak hours (previously shown in Figure 2) were input into Synchro along with the existing intersection geometric configurations and parameters such as Peak Hour Factor (PHF) (0.92), percent heavy vehicles (2 percent), lost time, etc. The levels of service at the study intersections under existing conditions are summarized in **Table 10** and the LOS calculation worksheets are contained in the separately bound "Traffic Operations Analysis Report."

Table 10: Existing (2007) – Peak Hour Intersection LOS

Intersection	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
Village Way/McFadden Ave.	48.7	D	37.2	D
Village Way/SR-55 SB Ramps[1]	30.1	D	12.4	B
Sycamore Ave./Newport Blvd.	25.3	C	26.4	C
SR-55 SB Ramps/Edinger Ave./Auto Mall Dr.	33.5	C	40.6	D
SR-55 NB Ramps/Edinger Ave.	18.8	B	20.7	C
SR-55 SB Off-ramp/Grand Ave.	21.1	C	19.0	B
Dyer Rd./Grand Ave.	13.8	B	19.8	B
SR-55 SB Ramps/Dyer Rd./Hotel Terrace Dr.	28.7	C	**55.5**	**E**
SR-55 NB Ramps/Dyer Rd.	18.1	B	10.5	B
Pullman St./Dyer Rd.	33.1	C	49.2	D
Hutton Centre Dr./Imperial Prom./MacArthur Blvd.	**179.7**	**F**	**70.4**	**E**
SR-55 SB Ramps/MacArthur Blvd.	18.9	B	14.3	B
SR-55 NB Ramps/MacArthur Blvd.	18.8	B	14.9	B
Fitch/MacArthur Blvd.	15.0	B	21.0	C
Red Hill Ave./MacArthur Blvd.	26.2	C	**67.0**	**E**

Notes: 1. Stop Controlled Intersection, All intersection analyses conducted using Synchro 6. Delay = Average delay in seconds per vehicle.

Table 11 indicates that all of the study area intersections are projected to operate at LOS D or better during the design year (2035) No-Build Alternative, except at the following locations.

- Village Way/McFadden Ave. (AM Peak Hour)
- Village Way/SR-55 SB Ramps (AM Peak Hour)
- Sycamore Ave./Newport Blvd. (AM and PM Peak Hour)
- SR-55 SB Ramps/Edinger Ave./Auto Mall Dr. (AM and PM Peak Hour)
- SR-55 NB Ramps/Edinger Ave. (AM and PM Peak Hour)
- SR-55 Ramps/Dyer Rd./Hotel Terrace Dr. (PM Peak Hour)
- Pullman St./Dyer Rd. (AM and PM Peak Hour)
- Hutton Centre Dr./Imperial Prom./MacArthur Blvd. (AM and PM Peak Hour)
- Red Hill Ave./MacArthur Blvd. (PM Peak Hour)

Table 11: Design Year (2035) No-Build – Peak Hour Intersection LOS

Intersection	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
Village Way/McFadden Ave.	**66.4**	**E**	42.8	D
Village Way/SR-55 SB Ramps[1]	**58.8**	**F**	15.7	C
Sycamore Ave./Newport Blvd.	**208.1**	**F**	**200.7**	**F**
SR-55 SB Ramps/Edinger Ave./Auto Mall Dr.	**67.8**	**E**	**159.0**	**F**
SR-55 NB Ramps/Edinger Ave.	**74.7**	**E**	**122.1**	**F**
SR-55 SB Off-ramp/Grand Ave.	25.5	C	20.6	C
Dyer Rd./Grand Ave.	17.0	B	21.1	C
SR-55 SB Ramps/Dyer Rd./Hotel Terrace Dr.	28.6	C	**69.7**	**E**
SR-55 NB Ramps/Dyer Rd.	19.2	B	14.2	B
Pullman St./Dyer Rd.	**61.7**	**E**	**67.1**	**E**
Hutton Centre Dr./Imperial Prom./MacArthur Blvd.	**189.7**	**F**	**108.0**	**F**
SR-55 SB Ramps/MacArthur Blvd.	22.2	C	16.3	B
SR-55 NB Ramps/MacArthur Blvd.	25.3	C	11.3	B
Fitch/MacArthur Blvd.	13.4	B	24.2	C
Red Hill Ave./MacArthur Blvd.	49.2	D	**97.7**	**F**

Notes:
1. Stop Controlled Intersection
Shaded cells indicate LOS E or LOS F.
All intersection analyses conducted using Synchro 6.
Delay = Average delay in seconds per vehicle.

4.1.7 HOV Analysis for 2035 No-Build

Since the freeway operations analysis in the HCM focuses only on the mainline and ramp volumes, the HOV lane will be analyzed using a standard volume-to-capacity ratio (v/c). Per discussions with Caltrans staff, a capacity of 2,200 vehicles per hour per lane will used for the HOV analysis. **Table 12** presents the HOV analysis for the design year (2035) No-Build Alternative within the study corridor. As can be seen in the table, most of the HOV segments are projected to operate with v/c ratios under 0.84 under the design year (2035) No-Build Alternative except at the following segments: NB Dyer Rd. to McFadden Ave. (PM Peak Hour), and SB McFadden Ave. to Dyer Rd. (AM Peak Hour).

Table 12: Design Year (2035) No-Build – HOV Lane Analysis

HOV Segment	HOV Lanes	AM Peak		PM Peak	
		Vol.	V/C	Vol.	V/C
NB I-405 to MacArthur Blvd.	1	900	0.41	1635	0.74
NB MacArthur Blvd. to Dyer Rd.	2	870	0.20	1830	0.42
NB Dyer Rd. to Edinger Ave,	1	1030	0.47	**2220**	**1.01**
NB Edinger Ave. to McFadden Ave.	1	1030	0.47	**2220**	**1.01**
NB McFadden Ave. to I-5	2	1180	0.27	2780	0.63
SB I-5 to McFadden Ave.	2	1995	0.45	1095	0.25
SB McFadden Ave. to Edinger Ave.	1	**2380**	**1.08**	1430	0.65
SB Edinger Ave. to Grand Ave.	1	**2380**	**1.08**	1430	0.65
SB Grand Ave. to Dyer Rd.	1	**2450**	**1.11**	1435	0.65
SB Dyer Rd. to MacArthur Blvd.	1	1850	0.84	1285	0.58
SB MacArthur Blvd. to I-405	2	1710	0.39	1115	0.25

Notes:
Shaded cells indicate v/c > 1.00.

Additionally, three HOV merge locations were also analyzed within the corridor:

1) SB SR-55/SB I-5 HOV,
2) SB SR-55/Alton Ave. OC and HOV drop ramp, and
3) NB SR-55/Alton Ave. OC and HOV drop ramp.

A modified analysis was required at these locations since the HCM does not have a direct method of analyzing a situation where an HOV to HOV merge occurs since the minimum number of lanes on the mainline (i.e., SR-55 HOV lane) is two. Therefore, the estimated volume in the number one lane adjacent to the HOV lane was combined with the SR-55 HOV volume so a two-lane analysis could be conducted with a single lane merging volume from I-5, I-405, or the Alton Ave. HOV drop ramps. **Table 13** presents the LOS results for the HOV merge locations within the corridor. The LOS results indicate that the HOV merge locations will operate at an unacceptable LOS E or F in at least one peak hour condition.

Table 13: Design Year (2035) No-Build – HOV Merge Analysis

HOV Merge Location	AM Peak		PM Peak	
	Den.	LOS	Den.	LOS
SB SR-55/SB I-5 HOV	**51.5**	**F**	**37.6**	**E**
SB SR-55/SB Alton Ave. OC and HOV Drop Ramp	34.3	D	**35.7**	**E**
NB SR-55/NB Alton Ave. OC and HOV Drop Ramp	30.6	D	**40.0**	**F**

Notes:
Shaded cells indicate LOS E or F.

Den = Density in passenger car equivalents per mile per lane.

4.1.8 Accident Data – Safety Review Analysis

SR-55 NB Accident Data

Accident data for SR-55 within the project limits between I-5 and MacArthur Blvd. was requested from Caltrans for the most recent 36-month period. Caltrans provided accident data between January 1, 2004 and December 31, 2006 from the Traffic Accident Surveillance and Analysis System (TASAS). 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 provided by Caltrans and reviewed during this PSR/PDS process. Actual accident rates are compared with average accident rates for similar highway facilities throughout the State. **Table 14** presents a summary of the mainline SR-55 TASAS data for the NB direction.

Table 14: SR-55 NB Mainline Accident Rates

Mile Post	Location	Statistical Data			Actual Accident Rates			Average Accident Rates		
		Total Accidents	Fatal	Injury	Fatal	Fatal + Injury	Total	Fatal	Fatal + Injury	Total
6.39 - 6.804	Main St to MacArthur Blvd. Off	76	0	15	0.000	0.30	1.50	0.004	0.29	0.95
6.805 - 7.157	MacArthur Blvd. Off to MacArthur Blvd. WB On	158	0	31	0.000	0.70	3.56	0.005	0.32	1.04
7.158 - 7.629	MacArthur Blvd. WB On to Dyer Rd. Off	49	1	7	0.016	0.13	0.80	0.005	0.33	1.05
7.630 - 8.079	Dyer Rd. Off to Dyer Rd. WB On	156	0	28	0.000	0.46	2.56	0.006	0.36	1.16
8.080 - 8.502	Dyer Rd. WB On to Warner	78	0	14	0.000	0.23	1.30	0.006	0.35	1.13
8.503 - 8.840	North of Warner Ave.	45	0	12	0.000	0.25	0.94	0.006	0.35	1.11
8.841 - 9.205	South of Edinger Ave. Off	6	0	1	0.000	0.02	0.12	0.006	0.35	1.00
9.206 - 9.410	Edinger Ave. Off to Edinger Ave. On	32	0	10	0.000	0.34	1.10	0.006	0.35	1.13
9.411 - 9.659	Edinger Ave. On to McFadden Ave. Off	50	0	13	0.000	0.35	1.35	0.004	0.31	1.03
9.660 - 9.779	McFadden Ave. Off to McFadden Ave. On	13	0	2	0.000	0.11	0.73	0.004	0.31	1.03
9.780 - 10.152	McFadden Ave. On to I-5 NB	139	1	23	0.019	0.46	2.67	0.004	0.31	1.02
10.153 - 10.449	I-5 NB to I-5 Jct	64	2	10	0.047	0.28	1.49	0.006	0.36	1.14
6.39 - 10.449	NB SR-55 Mainline	**866**	**4**	**166**						

Notes:
Accident data collected between 01/01/04 through 12/31/06.

SR-55 SB Accident Data

TASAS data was also obtained for the same time period for the SB mainline lanes within the project limits. **Table 15** presents a summary of the mainline SR-55 TASAS data for the SB direction. The table indicates that the accident rates on SB mainline SR-55 were generally higher than what would be expected based on a statewide average. During this period, 76 and 14 percent of the accidents on SB SR-55 within the project limits were found to be rear end and sideswipe type collisions, respectively. This suggests congestion-related conditions. The separately bounded "Traffic Operations Analysis Report" summarizes the accident data by type of collision within the project segments.

Table 15:
SR-55 SB Mainline Accident Rates

Mile Post	Location	Statistical Data			Actual Accident Rates			Average Accident Rates		
		Total Accidents	Fatal	Injury	Fatal	Fatal + Injury	Total	Fatal	Fatal + Injury	Total
10.449 - 10.153	I-5 Jct.	68	0	11	0.000	0.26	1.59	0.006	0.36	1.14
10.152 - 9.780	I-5 SB On to McFadden Ave. Off	227	0	39	0.000	0.75	4.35	0.004	0.31	1.02
9.779 - 9.660	McFadden Ave. Off to McFadden Ave. On	18	0	7	0.000	0.39	1.00	0.004	0.31	1.03
9.659 - 9.411	McFadden Ave. On to Edinger Ave. Off	73	0	20	0.000	0.54	1.97	0.004	0.31	1.03
9.410 - 9.206	Edinger Ave. Off to Edinger Ave. On	52	0	10	0.000	0.34	1.79	0.006	0.35	1.13
9.205 - 8.841	South of Edinger Ave. On	12	0	5	0.000	0.10	0.23	0.006	0.35	1.13
8.840 - 8.503	North of Warner Ave.	67	0	12	0.000	0.25	1.40	0.006	0.35	1.11
8.502 - 8.080	Warner Ave. to Dyer Rd. /Grand Ave. Off	61	0	14	0.000	0.23	1.02	0.006	0.35	1.13
8.079 - 7.630	Dyer Rd. /Grand Ave. Off to Dyer Rd. On	141	0	26	0.000	0.43	2.31	0.006	0.36	1.16
7.629 - 7.158	Dyer Rd. On to MacArthur Blvd. Off	73	1	12	0.016	0.21	1.20	0.005	0.33	1.05
7.157 - 6.805	MacArthur Blvd. Off to EB MacArthur Blvd. On	182	0	46	0.000	1.04	4.11	0.005	0.32	1.04
6.804 - 6.39	EB MacArthur Blvd. On to Main St	63	0	15	0.000	0.30	1.24	0.004	0.29	0.95
10.45 - R6.39	SB SR55 Mainline	1037	1	217						

Notes:
Accident data collected between 01/01/04 through 12/31/06.

4.2 SECONDARY DEFICIENCIES

In general, the traffic congestion, delay, and reduced travel speeds currently experienced on this segment of SR-55 are the result of several contributing factors as listed below:

- Non-standard deceleration length at NB MacArthur Blvd. off-ramp

- Non-standard lanes and left shoulders width at various locations
- Non-standard successive on-ramps at various locations such as SB MacArthur Blvd. on-ramps, NB MacArthur Blvd. on-ramps, and NB Dyer Rd on-ramps
- Non-standard auxiliary lane lengths at I-405 and I-5 branch connectors

5. CORRIDOR AND SYSTEM COORDINATION

This project is to study alternatives to improve north-south mobility between north Orange County and near the South Coast Metro area 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 Central Orange County Corridor Major Investment Study (MIS). The project is identified by the voter approved local sales tax measure and has identified project components for funding as part of Measure M renewal.

This project is consistent with the SR-55 Route Concept Report prepared in October 2000. The Route Concept Report indicates that Segment 6 (post mile 5.99) from I-405 to I-5 calls for eight lanes plus two HOV lanes in both directions. The Route Concept Report projected this segment to be at LOS F.

The following projects in Table 16 are on SR-55 and are within or adjacent to the proposed project. These projects have been incorporated in this study for each alternative.

Table 16:Projects in the Vicinity of Study Area

Caltrans EA	RTE	LOCATION	DESCRIPTION
EA12 - 0G950K	55	NB from Dyer Rd. to Edinger Ave.	Add auxiliary lane
EA12- 0G960K	55	SB from Dyer Rd. to Edinger Ave.	Add auxiliary lane
EA12- 0E2500	55	SB from Dyer Rd. to MacArthur Blvd.	Add auxiliary lane
EA12- 005500	55	Alton Ave OC	New OC and HOV drop Ramp
EA12- 0G260K	55	Realignments at I-5 /SR-55	Chokepoint Interchange Improvement
EA12- 0J760K	55	From Paularino Ave to 0.10 mile north of Meats Ave OC	Remove existing buffer to provides a continuous HOV access and standard GP lanes and shoulders
EA12-0H290K	55	PSR/PR MacArthur Blvd at SR-55	Ramp Widening Re-striping

6. ALTERNATIVES

The SR-55 corridor has insufficient capacity on the freeway mainline and major adjacent surface streets to handle existing and projected 2035 travel demand between the I-5 and I-405 freeways. This segment of SR-55 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 SR-55 are the result of several contributing factors. The three contributing factors are:

1. Limited GP lane capacity on SR-55;
2. Inadequate merging distances along the freeway due to the close proximity of on/off-ramps along the mainline; and
3. Non-standard lane and shoulder widths at various locations.

Three previously approved projects (12-0G960K, 12-0E2500, and 12-005500) are assumed to be in place under the "No-Build Baseline Alternative." The existing conditions as well as the improvement proposed as Baseline projects are described in detail in these three previous PID's.

This project proposes to add a combination of either one auxiliary and /or one GP lane in both NB and SB directions on SR-55 from the I-405 connector to south of the I-5 connectors. Additionally, this project would analyze the existing HOV lanes in both directions to add an additional HOV lane in each direction from the I-405 HOV terminus to the I-5 HOV entrance connector. Six project alternatives, which include the No-Build alternative (Baseline), have been evaluated and are presented in this report as shown in EXHIBIT B. In all five build alternatives, the existing HOV transitions / tapers have been lengthened to eliminate the non-standard tapers, providing greater merging distance. The existing buffer, which varies from 2 feet to 4 feet, is eliminated per Caltrans continuous access PSR (EA 0J760K) except near the I-405 and I-5 HOV direct connectors. At various locations, maximized left-turn pocket lengths to the freeway will be analyzed and provided during the Project Report (PR) phase. The project cost is estimated as listed in the Section 9 "Capital Outlay Estimate" **Table 54** for each alternative.

This project is divided into four 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 I-405 Connectors to MacArthur Blvd.
Segment 2: From MacArthur Blvd. to Dyer Rd.
Segment 3: From Dyer Rd. to Edinger Ave.
Segment 4: From Edinger Ave. to McFadden Ave.
Segment 5: From McFadden Ave. to I-5 Connectors

Included as a baseline condition is the Alton Ave. OC project with the future planned HOV drop ramps, the impact of traffic from these ramps on the operations of the SR-55 lanes, and the interchanges at MacArthur Blvd. and Dyer Rd. for each alternative. These alternatives were analyzed with either symmetrical or asymmetrical widening (shifted centerline) in order to reduce right-of-way impacts. The only possibility of shifting the centerline to reduce the right-of-way impact is between the MacArthur Blvd. and Dyer Rd. interchanges; which is accomplished by utilizing the existing Orange County Flood Control District "Lane Channel" along SB SR-55 per Alton Ave. OC project and HOV drop ramps project (EA 005500).

6.1 NO-BUILD BASELINE ALTERNATIVE

No-Build Baseline Alternative - The No-Build alternative includes the construction of the auxiliary lanes which were analyzed individually by Caltrans in the following projects 12-0G960K, 12-0E2500, 12-005500, and 12-0J760K. The No-Build Alternative will not meet future traffic demand. There is no capital cost for this alternative.

6.2 ALTERNATIVE 1

One of the main causes of the heavy traffic congestion on SR-55 is the heavy weaving due to the relative proximity of entrance and exit ramps in the interchange area. The minimum weaving length established by the Caltrans Highway Design Manual (HDM) is 1600 feet.

Within the project limit, there are areas that already have auxiliary lanes as listed below or that are in the project develop phase in Design and will be constructed in the future through programmed funding: (See schematic 1, EXHIBIT B)

1. From NB I-405 connector to MacArthur Blvd. off-ramp
2. From NB MacArthur Blvd. on-ramp to Dyer Rd. off-ramp (EA 005500)
3. From NB Edinger Ave. on-ramp to McFadden Ave. off-ramp
4. From SB I- 5 SB connector to McFadden Ave. off-ramp
5. From SB McFadden Ave. on-ramp to Edinger Ave. off-ramp
6. From SB Edinger Ave. on-ramp to Dyer Rd. off-ramp (EA 0G960K)
7. From SB Dyer Rd. on-ramp to MacArthur Blvd. off-ramp (EA 0E2500)
8. From SB MacArthur Blvd. on-ramp to I-405 SB connector

Due to non-standard weaving distances (less than 1600'); this alternative proposes to provide for new auxiliary lanes between the existing short spaced on- and off-ramps.

Under Alternative 1, auxiliary lanes would be constructed on the NB SR-55 at the interchanges between Dyer Rd. and Edinger Ave. and on the SB SR-55 at the interchanges between McFadden Ave. on-ramp and Edinger Ave. off-ramp. In addition, the existing two-lane freeway-to-freeway connector is extended to provide operational merging/diverging for the I-5 freeway connector. The merging lane would provide (approximately two miles in length) recommended operational design for freeway-to-freeway connector between the McFadden Ave. and Dyer Rd. The logical termini would be the Dyer Rd. interchange, and it is shown as a lane drop in the lane schematic for Alternative 1. 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 SR-55 on- and off-ramps, Dyer Rd., Edinger Ave., and McFadden Ave. interchanges. Improvements would require new right-of-way adjacent to the NB SR-55 at the interchanges between Dyer Rd. and Edinger Ave. and on the SB SR-55 at the interchanges between McFadden Ave. and Edinger Ave.

6.2.1 Segment 1: From I-405 Connectors to MacArthur Blvd.

Northbound: The existing NB SR-55 has three GP lanes south of the I-405 connectors. Three I-405 connectors merge with the NB SR-55 approximately 1500' south of the NB SR-55 MacArthur Blvd. off-ramps. The heavy traffic volume during PM peak hours, in combination with the short spacing between the successive on-ramps from I-405 NB and SB connectors to SR-55 (less than 400'), results in weaving that causes gridlock. To avoid this bottleneck, commuters utilize local arterials such as Red Hill Ave. from MacArthur Blvd. to Dyer Rd. for the NB direction.

In addition, the NB I-405 HOV drop ramp merges into SR-55 just before the NB MacArthur Blvd. on-ramp which extends the congestion from the I-405 merge to the NB Dyer Rd. on-ramp.

In addition to these problems, the following non-standard features exist within this segment and throughout the project limits:

1. Non-standard 11' wide general travel lanes instead of a standard width of 12'.
2. The inside left shoulder varies from 2' to 10' wide instead of 10'.

The existing I-405 connectors provide one additional GP lane to just before the NB MacArthur Blvd. off-ramp, resulting in a total of five GP lanes. The two existing HOV lanes are extended to join the future Alton Ave. HOV drop ramps.

The inside left shoulder would be re-striped to meet the standard of a 10' shoulder. The existing concrete barrier will remain in place. The existing NB loop on-ramps are under study by the city of Santa Ana to

provide one additional lane. Previous and on-going studies are presented in all alternatives to provide a comprehensive analysis of the SR-55 corridor.

The existing NB I-405 connector raises in grade over Main Street and descends just south of the NB MacArthur Blvd. off-ramp. An existing fourteen feet retaining wall adjacent to the right shoulder of the connector continues along Cowan Road separating the access road from the freeway. The existing Cowan Road width is thirty-six feet wide including the curb and gutter. Alternative 1 would not require relocation/reconstruction of this retaining wall.

Southbound: EB MacArthur Blvd. to the SB SR-55 on-ramps are under PSR/PR study for a ramp widening project, by the city of Santa Ana (EA 0H290K). The project proposes to add a second lane for storage during peak hours. This ramp merges as an auxiliary lane which drops at the I-405 NB and SB connector. Along the right shoulder, the existing fourteen feet retaining wall separates the freeway from Hutton Center Dr. (a local access road). This auxiliary lane drops off to the I-405 SB or NB connector. Alternative 1 would not impact this ramp, the existing retaining wall, or Hutton Center Dr. since it is part of the construction of the MacArthur Blvd. ramp widening project (EA 0H290K).

The addition of one lane will increase capacity at this heavily congested area while providing a two-lane exit to I-405 SB instead of sharing a lane with the I-405 NB connector. With proper signage, existing traffic on I-405 NB can be redirected to utilize the WB MacArthur Blvd. loop on-ramp (T intersection of loop on-ramp). This minor modification will improve traffic congestion substantially since it improves signage and direction at the I-405 NB/SB connector. In summary, I-405 NB traffic will be utilizing the loop on-ramp and the SB I-405 traffic will be utilizing the direct on-ramp.

Under Alternative 1, 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 SR-55 on- and off-ramps at the MacArthur Blvd., Dyer Rd., Edinger Ave., and McFadden Ave. interchanges. Improvements would require new right-of-way adjacent to NB SR-55 between the MacArthur Blvd. and Dyer Rd. interchanges and between the Dyer Rd. and Edinger Ave. interchanges.

6.2.2 Segment 2: From MacArthur Blvd. to Dyer Rd.

Proposed freeway widening and improvements within this segment are assumed to be constructed in the future per the Alton Ave. OC and HOV drop ramps project (EA 005500). This project would re-stripe the existing HOV lane from the I-405 connector to join the Alton Ave. OC and HOV drop ramps with 12’ wide HOV lanes, a standard 10’ left shoulder, and no buffer. The NB MacArthur Blvd. on-ramp alignment has to be slightly modified, but the existing MacArthur Blvd. structure is not required to be widened.

Per the approved Alton Ave. OC and HOV drop ramps Project Report/Environmental Document (PA/ED), the existing SR-55 centerline has to be shifted 19’ westerly, to minimize the right-of-way impact for ultimate widening. The existing eight feet by four feet Lane Channel parallels the SB freeway, and is jacked under the existing freeway (or cut and covered) to be realigned along the NB corridor outside of the freeway right of way. For complete detailed discussions of the proposed improvements on Alton Ave. OC,drop ramps and Lane Channel, refer to the PA/ED EA 005500.

Per the PDT concurrence, the Alton Ave. OC and HOV drop ramps project is shown only as a reference for the SR-55 corridor widening to assure smooth connectivity to I-405 HOV drop ramps, and MacArthur Blvd. and Dyer Rd. NB and SB ramps. Due to the proposed removal of the existing four feet buffer and the standard taper of HOV lanes from the I-405 connectors, both the NB on-ramp and SB off-ramp at

MacArthur Blvd. had to be reconfigured from the Alton Ave. OC and HOV drop ramps project. Auxiliary lanes are provided on both SB (EA 0E2500) and NB (EA 005500) from MacArthur Blvd. to Dyer Rd. Pullman St. will be realigned and designed per the city of Santa Ana design standard plans. Dyer Rd. UC structure will be widened as shown in EXHIBIT K.

6.2.3 Segment 3: From Dyer Rd. to Edinger Ave.

***Northbound**:* This alternative, which was prepared and approved by Caltrans (EA 0G950K), proposes to add twelve feet wide auxiliary lane between the NB (West) Dyer Rd. on-ramp and NB Edinger Ave. off-ramp. This new auxiliary lane will tie into the newly constructed NB Edinger Ave. off-ramp, with some minor modifications, providing a continuous auxiliary lane between Dyer Rd and Edinger Ave. This alternative will widen the NB Edinger Ave. off-ramp to a two-lane exit ramp. The auxiliary lane will be a mandatory exit lane and the fourth lane would be an optional exit lane. The NB (West) Dyer Rd. on-ramp alignment will be realigned, and a retaining wall will be required at the Warner Ave. OC (Bridge No. 55-394), along NB SR-55 to accommodate pavement widening. This alternative will require additional right-of-way along the NB SR-55 from the (West) Dyer Rd. on-ramp to the Edinger Ave. off-ramp. Refer to ATTACHMENT 1 for Right-of-way Plans.

In addition, a tieback wall will be required at the Warner Ave. OC (Bridge No. 55-394), along NB SR-55 to accommodate the widening. Also, Dyer Rd. UC (Bridge No 55-409) will be widened to accommodate the upgrade of all the lanes, shoulders, and mandatory median to standard width as specified in the HDM.

Existing electrical power lines and communication boxes which belong to Southern California Edison and PacBell respectively will require relocation.

***Southbound**:* Alternative 1 proposes new GP lane on SB SR-55 which has same pavement widening as auxiliary lane provided by Caltrans approved PSR (EA 0G960K) from Dyer Rd. to Edinger Ave. Caltrans approved PSR (EA 0G960K) is funded by the State Highway Operation and Protection Program (SHOPP) for the Plans, Specifications, and Estimates (PS&E) phase. There are over 1800 vehicles per hour exiting at the Dyer Rd. off-ramps, but get trapped in the existing GP lanes resulting in heavy congestion within this segment. Traffic in this segment is also heavily congested by truck traffic. The new GP along SB SR-55 will improve goods movement for heavy truck traffic. In addition, it would also provide mandatory design standard width to the HOV lane, general-purpose lanes, shoulders, and median as specified in the HDM to the existing non-standard features on this segment.

SB Ritchey Street, a frontage road adjacent to SB SR-55, will be separated by a retaining wall and concrete barrier.

6.2.4 Segment 4: From Edinger Ave. to McFadden Ave.

***Northbound**:* There is an existing NB auxiliary lane within this segment and therefore, no additional widening is required under Alternative 1.

Southbound: Based on the approved PSR (EA 0G260K), Chokepoint Interchange Improvement at I-5/SR-55 (prepared by OCTA), the existing SB auxiliary lane to McFadden Ave. is eliminated to remove the weaving between the I-5 SB connectors and the SR-55 SB McFadden Ave. exit ramp. The McFadden Ave. exit ramp will be converted to a one-lane exit ramp from the existing two-lane ramp by eliminating the existing SB auxiliary lane and converting existing SB auxiliary lane to the new GP lane. Moreover, this alternative proposes new auxiliary lane on SB SR-55 from Edinger Ave. to McFadden Ave. in order to increase mainline freeway weaving and capacity.

North of Edinger Ave., SR-55 (South Tustin Overhead [Bridge No. 55-0026]) crosses over the Southern California Regional Rail Authority (SCRRA) tracks. The tracks are owned and maintained by OCTA and are part of the Los Angeles-San Diego Rail Corridor (LOSSAN).

The existing minimum vertical clearance at this location is 22.7 ft. This vertical clearance is less than the amount recommended in Topic 309.2 "Vertical Clearance" in California HDM that specifies a minimum vertical clearance requirement of 23.0 ft over the tracks. It should be noted that the minimum vertical clearance is under the existing bridge, and not above the widening. Therefore, the widening will not affect the vertical clearance. The proposed structure would match the existing vertical clearance.

6.2.5 Segment 5: From McFadden Ave. to I-5 Connectors

***Northbound*:** This segment was previously studied and it was concluded that no additional widening would be feasible due to major impacts on the existing HOV drop ramps, I-5/SR-55 connectors, and out rigger column system.

The existing two-lane SB I-5 connector and the NB I-5 connector to SB SR-55 have sufficient auxiliary lane distance to merge to SB SR-55 (1787'). However, due to high traffic volume from the two connectors, the existing SB auxiliary lane would be converted to a GP lane to provide the additional capacity needed within this heavily congested segment of SR-55. This would not modify the lane configurations at the SB or NB connectors from I-5 to SR-55 (EA 0G260K).

Southbound: By converting the existing auxiliary lane to an additional GP lane, the freeway capacity is increased. In addition, the weaving distance is increased for SB I-5 traffic to merge more easily with SB SR-55 traffic. This increase in weaving distance will enhance the weaving LOS within this section of the freeway.

This study proposes to re-stripe the existing SB SR-55 HOV lane merge area with the HOV direct connector from I-5 to eliminate the existing congestion at the SR-55 HOV lanes. This is due to an existing short 500' non-standard merging length. Alternative 1 will provide 1000' transition at the I-5 connectors with a 12' wide HOV lane.

The estimated cost for Alternative 1 is $103.33 million.

6.3 ALTERNATIVE 2 (1 GP ONLY)

Under Alternative 2, a fifth GP travel lane would be constructed on both NB and SB SR-55 from just south of the MacArthur Blvd. interchange to just north of Edinger Ave. The additional GP travel lane would reduce the space available for freeway ramps; therefore, the ramp curvature would be altered at the SR-55 on- and off-ramps at the MacArthur Blvd., Dyer Rd., Edinger Ave., and McFadden Ave. interchanges. Alternative 2 improvements would require new right-of-way adjacent to the NB SR-55 at the interchanges between I-405 and MacArthur Blvd. and between Dyer Rd. and Edinger Ave. New right-of-way would also be required adjacent to the SB SR-55 at the interchanges between McFadden Ave. and Edinger Ave.

Auxiliary lanes would be constructed on NB SR-55 at the interchanges between the I-405 connector and MacArthur Blvd. and on Edinger Ave. on-ramp. Auxiliary lanes would be constructed on SB SR-55 at the interchanges between McFadden Ave. and Edinger Ave and between MacArthur Blvd. and the I-405 connector.

The existing NB I-405 connector raises in grade over Main Street and descends just south of the Mac Arthur Blvd. off-ramp on NB SR-55. An existing fourteen feet retaining wall along the right shoulder of the connector joins proposed four to fourteen feet retaining wall along Cowan Rd. separating the access road from the freeway. The existing Cowan Rd. width is thirty six feet including the curb and gutter. Alternative 2 would require relocation/reconstruction of the retaining wall.

Existing auxiliary lanes will remain in place; however, the proposed auxiliary lanes in Alternative 1 will be replaced by a new GP lane to increase freeway capacity. The new mainline geometrics will also comply with HDM standards; meaning all existing non-standard 11' lanes will be widened to the standard width of 12' with a 10' right shoulder. The proposed widening crossfalls will be at a 2% grade, which is standard and will match superelevation requirements. Due to the widening, the superelevation transitions may require crossfall corrections to provide adequate drainage. During the PR phase, this will be analyzed and corrected as appropriate. Funds have been included in the estimate for this item. All existing ramp terminus will remain unchanged. Ramps will be 12' or wider for truck travel lanes, and four feet and eight feet for left and right shoulders, respectively.

The cost for Alternative 2 is estimated at $127.49 million.

6.4 ALTERNATIVE 3 (AUX + 1GP)

Under Alternative 3, the additional auxiliary lanes proposed under Alternative 1 would be combined with the additional GP lane proposed under Alternative 2. The additional GP and auxiliary lanes would reduce the space available for freeway ramps; therefore, the ramp curvature would be altered at the SR-55 on- and off-ramps at the MacArthur Blvd., Dyer Rd., and McFadden Ave. interchanges.

Since this alternative would add both GP and auxiliary lanes to SR-55, it would require right-of-way above and beyond that of Alternatives 1 and 2. Alternative 3 improvements would require right-of-way adjacent to the NB SR-55 at the interchanges between the I-405 connector and Edinger Ave. Right-of-way would also be required adjacent to the SB SR-55 at the interchanges between McFadden Ave. and MacArthur Blvd. The proposed NB MacArthur Blvd. off-ramp and NB McFadden Ave. on-ramp would be non-standard due to right-of-way constraints and the existing overcrossing structure, respectively. In addition, SB MacArthur Blvd. on-ramp and NB I-405 connector to SR-55 would have four feet non-standard shoulders due to the existing bent and existing retaining wall, respectively. Refer to EXHIBIT M for a list of non-standard design features.

The proposed auxiliary lanes would be constructed on the NB SR-55 at the interchanges between the I-405 connector and on Edinger Ave. on-ramp. The proposed auxiliary lanes would be constructed on the SB SR-55 at the interchanges between McFadden Ave and the I-405 connector.

The existing NB I-405 connector elevates raises in grade Main Street and descends just south of the MacArthur Blvd. off-ramp on NB SR-55. An existing fourteen feet retaining wall along the right shoulder of the connector joins the proposed four to fourteen feet retaining wall along Cowan Rd. separating the access road from the freeway. The existing Cowan Rd. width is thirty-six feet including the curb and gutter. Alternative 3 would require relocation/reconstruction of this wall (see EXHIBIT G).

The estimated cost for Alternative 3 is $209.63 million.

6.5 ALTERNATIVE 4 (AUX + 1 GP + HOV IMPROVEMENTS)

Under Alternative 4, an auxiliary lane would be constructed as described in Alternative 1 and a GP lane would be constructed as described in Alternative 2. In addition, improvements would be made to the

HOV lanes between the I-5 and I-405 interchanges. In the SB SR-55 direction, an additional HOV lane would be provided from where the SB I-5/SB SR-55 direct HOV connector transitions into the SR-55 HOV lane to the I-405 direct HOV connectors. At the northbound direction, an additional HOV lane would be provided from where the NB I-405/NB SR-55 direct HOV connector transitions into the SR-55 HOV lane to the I-5 direct HOV connector. Similar to Alternative 3, the additional GP travel lanes and auxiliary lanes would reduce the space available for freeway ramps; therefore, the ramp curvature would be altered at the SR-55 on- and off-ramps at the MacArthur Blvd., Dyer Rd., and Edinger Ave. interchanges. In addition to the right-of-way described in Alternative 3, Alternative 4 improvements would require additional right-of-way adjacent to the NB and SB SR-55 at the interchanges between McFadden Ave. and the I-5 connector.

The proposed auxiliary lanes would be constructed on the NB SR-55 at the interchanges between the I-405 connector and on Edinger Ave. on-ramp. The proposed auxiliary lanes would be constructed on the SB SR-55 at the interchanges between the I-5 connectors and the I-405 connectors.

This Alternative will be documented and removed from further consideration during the PA/ED phase due to extensive right-of-way impacts (three-lane widening). The existing adjacent facilities (mainly commercial buildings) would be impacted and, therefore, would require significant business disruption and relocation which would not be a feasible solution to address the traffic demand. This alternative was developed to present the boundary of the impact to the adjacent structures and facilities as shown in EXHIBIT H.

6.6 ALTERNATIVE 5 (AUX + HOV IMPROVEMENTS)

Under Alternative 5, auxiliary lanes would be constructed as described under Alternative 1 and HOV improvements would be made as described in Alternative 4. Specifically, at the SB SR-55 direction, an additional HOV lane would be provided from where the SB I-5/SB SR-55 direct HOV connector transitions into the SR-55 HOV lane to the I-405 direct HOV connectors. In the northbound direction, an additional HOV lane would be provided from where the NB I-405/NB SR-55 direct HOV connector transitions into the SR-55 HOV lane to the I-5 direct HOV connector.

Similar to Alternative 1, the additional auxiliary lanes would reduce the space available for freeway ramps; therefore, the ramp curvature would be altered at the SR-55 on- and off-ramps at the MacArthur Blvd., Dyer Rd., Edinger Ave., and McFadden Ave. interchanges.

The proposed NB McFadden Ave. on-ramp would be non-standard due to the existing structure. Refer to EXHIBIT N for a list of non-standard design features. Alternative 5 improvements would require additional right-of-way adjacent to the NB SR-55 at the interchanges between the Dyer Rd. and Edinger Ave. Additional right-of-way would also be required adjacent to the SB SR-55 at the interchanges between McFadden Ave. and Dyer Rd.

The proposed auxiliary lanes would be constructed on NB SR-55 at the interchanges between Dyer Rd. and the I-5 connector. The proposed auxiliary lane would be constructed on SB SR-55 at the interchanges between McFadden Ave. and Edinger Ave.

The estimated cost for Alternative 5 is $179.95 million.

6.7 TRAFFIC IMPROVEMENTS FOR BUILD ALTERNATIVES

A Traffic Operation Analysis Report was prepared and is provided as a separately bound report. The SR-55 corridor between I-5 and MacArthur Blvd. 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 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 SR-55 corridor, including limited mainline capacity and short merging distances at the on- and off-ramps. As previously mentioned, this project will analyze the design year (2035) traffic impacts associated with a No-Build Alternative and five Build Alternatives that address the existing and future deficiencies along the SR-55 corridor.

6.7.1 Travel Demand Forecast Model

The Orange County Transportation Analysis Model (OCTAM) was utilized by OCTA staff to provide future year (2030) average daily traffic (ADT), as well as AM and PM peak period directional approach/departure volumes for the study area. Separate OCTAM model results were provided for the No-Build and each of the five Build Alternatives. Through discussions with OCTA, Caltrans, and the PDT, it was decided that the future year (2030) volumes provided through OCTAM would be manually increased for the development of the design year (2035) volumes.

Both AM and PM peak hour turning movement volumes were post-processed from the design year (2035) peak hour approach and departure volumes in conjunction with the existing (2007) turning movement volumes. ADT volumes, along with morning and evening peak hour turning movement volumes, were post-processed and balanced between intersections, which are presented later in this report.

6.7.2 Analysis Methodologies

The traffic Operation Analysis Report evaluates traffic operations on SR-55 from I-5 to MacArthur Blvd. under existing (2007) conditions, future year (2035) No-Build conditions, and future year (2035) conditions for the five Build Alternatives. Both freeway operations and intersection operations are analyzed.

6.7.3 Intersection Operations

Intersection LOS were calculated using the HCM analysis methodologies, using the Synchro 6 software, which accounts for the effects of signal coordination and platoon formation on intersection operations. Traffic signal timing was optimized using Synchro 6. The network cycle lengths ranging from 50 seconds to 150 seconds at 10 second intervals were first analyzed and evaluated. A common network cycle length was selected for optimization based upon several measures of effectiveness such as performance index, total delay, total stops, and unserved vehicles. Next, network offsets along with the phase splits at the study intersections were optimized.

The average control delay per vehicle is estimated for each lane group and aggregated for each approach and for the intersection as a whole. LOS is directly related to the control delay value.

6.7.4 Design Year (2035) Projected Traffic Volumes

Traffic forecasts (2030) from OCTAM were used in the development of design year traffic volume projections. The baseline model network (used for the No-Build condition) was modified to reflect the auxiliary lane, GP lane, and HOV lane improvements identified in each of the five Build alternatives. Since OCTAM currently forecasts to year 2030 conditions, the forecast volumes were manually increased using a calculated growth factor between existing and the forecast volumes**.**

The following two tables (**Table 17** and **Table 18**) present the mainline (GP lanes and HOV lanes) Design Year (2035) peak hour volumes by segment of the study corridor for the No-Build and each of the five Build Alternatives in the NB and SB directions along SR-55, respectively. The peak hour intersection turning movement volumes for the No-Build and the Build conditions are presented later in this section.

Table 17:
Design Year (2035) Mainline Volumes along NB SR-55

SR-55 Segment (AM Peak Hour)	No Build		Build (Alt. 1)		Build (Alt. 2)		Build (Alt. 3)		Build (Alt. 4)		Build (Alt. 5)	
	General Purpose	HOV	General Purpose	HOV	General Purpose	HOV	General Purpose	HOV	General Purpose	HOV	General Purpose	HOV
I-405	10210	900	10315	1210	10715	1180	11015	1155	10770	1185	10795	1185
MacArthur Blvd	9315	870	9510	1160	9825	1190	10030	1190	9895	1165	10005	1155
Dyer Rd	8570	1030	8455	1050	9205	1015	9385	1020	9195	1080	9295	1130
Edinger Ave	8530	1030	8790	1050	9215	1015	9375	1020	9160	1080	9255	1130
McFadden Ave	7845	1180	8090	1195	8410	1190	8530	1165	8305	1150	8550	1145
I-5												

SR-55 Segment (PM Peak Hour)	No Build		Build (Alt. 1)		Build (Alt. 2)		Build (Alt. 3)		Build (Alt. 4)		Build (Alt. 5)	
	General Purpose	HOV	General Purpose	HOV	General Purpose	HOV	General Purpose	HOV	General Purpose	HOV	General Purpose	HOV
I-405	7645	1635	7300	1570	8140	1500	8260	1435	8190	1910	7130	1910
MacArthur Blvd	8335	1830	8330	1385	9145	1380	9360	1215	8965	2010	7895	2010
Dyer Rd	9980	2220	10650	2075	11435	2150	11675	1985	11065	3200	10155	3090
Edinger Ave	10155	2220	10850	2075	11845	2150	11855	1985	11175	3200	10365	3090
McFadden Ave	9200	2780	9540	2825	10345	2920	10140	2925	9890	3655	9640	3130
I-5												

Table 18:
Design Year (2035) Mainline Volumes along SB SR-55

SR-55 Segment (AM Peak Hour)	No Build		Build (Alt. 1)		Build (Alt. 2)		Build (Alt. 3)		Build (Alt. 4)		Build (Alt. 5)	
	General Purpose	HOV	General Purpose	HOV	General Purpose	HOV	General Purpose	HOV	General Purpose	HOV	General Purpose	HOV
I-5	9610	1995	10500	2110	10560	2155	10530	2150	10805	2240	10630	2240
McFadden Ave	10795	2380	12045	2330	12210	2335	12330	2305	11645	3860	11325	3880
Edinger Ave	10180	2380	11400	2330	11565	2335	11735	2305	11060	3860	10710	3880
Grand Ave	9245	2450	9835	3025	10280	2745	10330	2840	10160	3860	9810	3890
Dyer Rd	9695	1850	10605	2265	10960	2125	10935	2240	10215	3805	9740	3830
MacArthur Blvd	8830	1710	9035	1515	9255	1505	9335	1505	9725	1715	9165	1740
I-405												

SR-55 Segment (PM Peak Hour)	No Build		Build (Alt. 1)		Build (Alt. 2)		Build (Alt. 3)		Build (Alt. 4)		Build (Alt. 5)	
	General Purpose	HOV	General Purpose	HOV	General Purpose	HOV	General Purpose	HOV	General Purpose	HOV	General Purpose	HOV
I-5	9035	1095	9415	1030	9510	1090	9505	1090	9535	1065	9315	1065
McFadden Ave	9115	1430	9420	1555	9545	1555	9665	1540	9495	1720	9220	1725
Edinger Ave	7965	1430	9075	1555	9210	1555	9335	1540	9160	1720	8870	1725
Grand Ave	8110	1435	8405	1560	8540	1555	8665	1545	8490	1720	8200	1730
Dyer Rd	9205	1285	9405	1515	9645	1400	9715	1435	9490	1695	9160	1705
MacArthur Blvd	10015	1115	10200	1405	10375	1380	10480	1385	10435	1420	10085	1445
I-405												

Notes:
Design year (2035) volumes generated from the forecast (203) projections using the Orange County Transportation Analysis Model (OCTAM) and applying a growth percentage.
HOV = High Occupancy Vehicle lane.

6.7.5 Design Year (2035) Alternative 1 Freeway Operations

The design year (2035) No-Build Alternative was considered as a baseline to measure and compare the proposed improvement alternatives for the assumption of 20 years after completion of construction. Alternative 1 primarily adds one auxiliary lane along NB and SB SR-55 between upstream on-ramp and downstream off-ramp segments between I-5 and MacArthur Blvd. that are not included in the No-Build Alternative. There are two auxiliary lane segments added to this Alternative 1 condition.

The first auxiliary lane is along NB SR-55 between the WB MacArthur Blvd. on-ramp and the Dyer Rd. off-ramp. The second segment provides a new GP lane along SB SR-55 between the SB I-5 ramp and the Edinger Ave. on-ramp, where it would connect with the new SB auxiliary lane in the baseline condition (EA 0G960K) between the Edinger Ave. on-ramp and both the Grand Ave. and Dyer Rd. off-ramps. This new GP lane would remove the baseline weave segment in the SB direction between the SB I-5 ramp and the McFadden Ave. off-ramp, while maintaining the existing auxiliary lane between the McFadden Ave. on-ramp and the Edinger Ave. off-ramp. The schematic diagram for Alternative 1 condition is presented in EXHIBIT B.

The mainline lane, HOV lane and ramp volumes are developed for the design year (2035) Build Alternative 1 along with the freeway operations analysis. **Table 19** summarizes the density and LOS results of the analysis performed for the basic freeway segment locations under the design year (2035) Alternative 1 conditions. The mainline lanes are identified, and a 0.9 peak hour factor was used in the analysis along with the truck percentages (6 percent NB and 7 percent SB) for each segment.

Table 19:
Design Year (2035) Alternative 1 – Basic Freeway Segment Analysis

Mainline Segment	Lanes	2035 No-Build				Lanes	2035 Alternative 1			
		AM Peak		PM Peak			AM Peak		PM Peak	
		Den.	LOS	Den.	LOS		Den.	LOS	Den.	LOS
NB I-405 to MacArthur Blvd.	4	---	**F**	34.8	D	4	---	**F**	32.1	D
NB MacArthur Blvd. to Dyer Rd.	4	---	**F**	**44.2**	**E**	4	---	**F**	**44.1**	**E**
NB Dyer Rd. to Edinger Ave,	4	---	**F**	---	**F**	4	---	**F**	---	**F**
NB Edinger Ave. to McFadden Ave.	5	29.7	D	**41.4**	**E**	5	31.1	D	---	**F**
NB McFadden Ave. to I-5	5	**35.2**	**E**	---	**F**	5	**36.2**	**E**	---	**F**
SB I-5 to McFadden Ave.	4	---	**F**	---	**F**	5	---	**F**	**35.4**	**E**
SB McFadden Ave. to Edinger Ave.	4	---	**F**	---	**F**	5	---	**F**	**35.5**	**E**
SB Edinger Ave. to Grand Ave.	4	---	**F**	---	**F**	5	---	**F**	33.1	D
SB Grand Ave. to Dyer Rd.	4	---	**F**	**41.7**	**E**	4	---	**F**	---	**F**
SB Dyer Rd. to MacArthur Blvd.	4	---	**F**	---	**F**	4	---	**F**	---	**F**
SB MacArthur Blvd. to I-405	4	---	**F**	---	**F**	4	---	**F**	---	**F**

Notes: Shaded cells indicate LOS E or F; Den. = Density in passenger car equivalents per mile per lane.

6.7.6 Design Year (2035) Alternative 2 Freeway Operations

Alternative 2 adds one GP lane to NB and SB SR-55 between I-5 and MacArthur Blvd. as shown in the schematic diagram in EXHIBIT B. The additional GP lane in this Alternative replaces the auxiliary lanes identified in the No-Build Alternative. However, auxiliary lanes are maintained at the following locations listed below.

- NB SR-55 between I-405 NB ramp and MacArthur Blvd. off-ramp
- SB SR-55 between McFadden Ave. on-ramp and Edinger Ave. off-ramp
- SB SR-55 between EB MacArthur Blvd. on-ramp and I-405 SB ramp

Table 20:
Design Year (2035) Alternative 2 – Basic Freeway Segment Analysis

Mainline Segment	Lanes	2035 No-Build				Lanes	2035 Alternative 2			
		AM Peak		PM Peak			AM Peak		PM Peak	
		Den.	LOS	Den.	LOS		Den.	LOS	Den.	LOS
NB I-405 to MacArthur Blvd.	4	---	**F**	34.8	D	5	---	**F**	27.1	D
NB MacArthur Blvd. to Dyer Rd.	4	---	**F**	**44.2**	**E**	5	**38.3**	**E**	33.3	D
NB Dyer Rd. to Edinger Ave,	4	---	**F**	---	**F**	5	33.7	D	---	**F**
NB Edinger Ave. to McFadden Ave.	5	29.7	D	**41.4**	**E**	6	25.7	C	**38.7**	**E**
NB McFadden Ave. to I-5	5	**35.2**	**E**	---	**F**	6	23.1	C	30.2	D
SB I-5 to McFadden Ave.	4	---	**F**	---	**F**	5	---	**F**	**36.2**	**E**
SB McFadden Ave. to Edinger Ave.	4	---	**F**	---	**F**	5	---	**F**	**36.4**	**E**
SB Edinger Ave. to Grand Ave.	4	---	**F**	---	**F**	5	---	**F**	34.0	D
SB Grand Ave. to Dyer Rd.	4	---	**F**	**41.7**	**E**	5	**43.2**	**E**	30.0	D
SB Dyer Rd. to MacArthur Blvd.	4	---	**F**	---	**F**	5	---	**F**	**37.2**	**E**
SB MacArthur Blvd. to I-405	4	---	**F**	---	**F**	5	34.3	D	**44.3**	**E**

Notes: Shaded cells indicate LOS E or F; Den. = Density in passenger car equivalents per mile per lane.

6.7.7 Design Year (2035) Alternative 3 Freeway Operations

The Alternative 3 condition combines the additional auxiliary lanes proposed under Alternative 1 with the additional GP lane proposed under Alternative 2 as shown in the schematic diagram in EXHIBIT B. In addition to the GP lane, auxiliary lanes are maintained (baseline condition) or provided (new) at the locations listed below.

- NB SR-55 between NB I-405 ramp and MacArthur Blvd. off-ramp (baseline)
- NB SR-55 between WB MacArthur Blvd. on-ramp and Dyer Rd. off-ramp (new)
- NB SR-55 between WB Dyer Rd. on-ramp and Edinger Ave. off-ramp (baseline)
- SB SR-55 between McFadden Ave. on-ramp and Edinger Ave. off-ramp (baseline)
- SB SR-55 between Edinger Ave. on-ramp and Dyer Rd. off-ramp (baseline)
- SB SR-55 between Dyer Rd. on-ramp and MacArthur Blvd. off-ramp (baseline)
- SB SR-55 between EB MacArthur Blvd. on-ramp and I-405 SB ramp (baseline)

Similar to the Alternative 2 condition, the baseline auxiliary lane along SB SR-55 between the SB I-5 connector ramp and the McFadden Ave. off-ramp is replaced with the new GP lane.

Table 21:
Design Year (2035) Alternative 3 – Basic Freeway Segment Analysis

Mainline Segment	2035 No-Build					2035 Alternative 3				
	Lanes	AM Peak		PM Peak		Lanes	AM Peak		PM Peak	
		Den.	LOS	Den.	LOS		Den.	LOS	Den.	LOS
NB I-405 to MacArthur Blvd.	4	---	**F**	34.8	D	5	---	**F**	27.6	D
NB MacArthur Blvd. to Dyer Rd.	4	---	**F**	**44.2**	**E**	5	**40.2**	**E**	34.7	D
NB Dyer Rd. to Edinger Ave,	4	---	**F**	---	**F**	5	34.9	D	---	**F**
NB Edinger Ave. to McFadden Ave.	5	29.7	D	**41.4**	**E**	6	26.3	D	**38.8**	**E**
NB McFadden Ave. to I-5	5	**35.2**	**E**	---	**F**	6	23.5	C	29.3	D
SB I-5 to McFadden Ave.	4	---	**F**	---	**F**	5	---	**F**	**36.1**	**E**
SB McFadden Ave. to Edinger Ave.	4	---	**F**	---	**F**	5	---	**F**	**37.4**	**E**
SB Edinger Ave. to Grand Ave.	4	---	**F**	---	**F**	5	---	**F**	34.9	D
SB Grand Ave. to Dyer Rd.	4	---	**F**	**41.7**	**E**	5	**43.8**	**E**	30.7	D
SB Dyer Rd. to MacArthur Blvd.	4	---	**F**	---	**F**	5	---	**F**	**37.8**	**E**
SB MacArthur Blvd. to I-405	4	---	**F**	---	**F**	5	34.9	D	---	**F**

Notes: Shaded cells indicate LOS E or F; Den. = Density in passenger car equivalents per mile per lane.

6.7.8 Design Year (2035) Alternative 4 Freeway Operations

Alternative 4 combines the additional auxiliary lanes proposed under Alternative 1, the additional GP lane proposed under Alternative 2, along with HOV lane improvements as shown in the schematic diagram in Traffic Appendix A (separately bound). HOV lane improvements are proposed to the SB SR-55/I-5 HOV direct connector and to the NB SR-55/I-405 HOV direct connectors. This alternative maintains (baseline condition) or provides (new) auxiliary lane segments at the locations listed below.

- NB SR-55 between NB I-405 ramp and MacArthur Blvd. off-ramp (baseline)
- NB SR-55 between WB MacArthur Blvd. on-ramp and Dyer Rd. off-ramp (new)
- NB SR-55 between WB Dyer Rd. on-ramp and Edinger Ave. off-ramp (baseline)
- SB SR-55 between SB I-5 ramp and McFadden Ave. off-ramp (new)
- SB SR-55 between McFadden Ave. on-ramp and Edinger Ave. off-ramp (baseline)
- SB SR-55 between Edinger Ave. on-ramp and Dyer Rd. off-ramp (baseline)
- SB SR-55 between Dyer Rd. on-ramp and MacArthur Blvd. off-ramp (baseline)
- SB SR-55 between EB MacArthur Blvd. on-ramp and I-405 SB ramp (baseline)

Table 22:
Design Year (2035) Alternative 4– Basic Freeway Segment Analysis

Mainline Segment	2035 No-Build					2035 Alternative 4				
	Lanes	AM Peak		PM Peak		Lanes	AM Peak		PM Peak	
		Den.	LOS	Den.	LOS		Den.	LOS	Den.	LOS
NB I-405 to MacArthur Blvd.	4	---	**F**	34.8	D	5	---	**F**	27.3	D
NB MacArthur Blvd. to Dyer Rd.	4	---	**F**	**44.2**	**E**	5	**39.0**	**E**	32.2	D
NB Dyer Rd. to Edinger Ave,	4	---	**F**	---	**F**	5	33.6	D	---	**F**
NB Edinger Ave. to McFadden Ave.	5	29.7	D	**41.4**	**E**	6	25.5	C	**34.4**	**D**
NB McFadden Ave. to I-5	5	**35.2**	**E**	---	**F**	6	22.8	C	28.3	D
SB I-5 to McFadden Ave.	4	---	**F**	---	**F**	5	---	**F**	**36.4**	**E**
SB McFadden Ave. to Edinger Ave.	4	---	**F**	---	**F**	5	---	**F**	**36.1**	**E**
SB Edinger Ave. to Grand Ave.	4	---	**F**	---	**F**	5	---	**F**	33.7	D
SB Grand Ave. to Dyer Rd.	4	---	**F**	**41.7**	**E**	5	**42.0**	**E**	29.7	D
SB Dyer Rd. to MacArthur Blvd.	4	---	**F**	---	**F**	5	**42.5**	**E**	**36.0**	**E**
SB MacArthur Blvd. to I-405	4	---	**F**	---	**F**	5	**37.9**	**E**	**45.0**	**E**

Notes: Shaded cells indicate LOS E or F; Den. = Density in passenger car equivalents per mile per lane.

6.7.9 Design Year (2035) Alternative 5 Freeway Operations

Alternative 5 combines the additional auxiliary lanes proposed under Alternative 1 with the additional HOV lane improvements proposed under Alternative 4 as shown in the schematic diagram in Traffic Appendix A (separately bound). HOV lane improvements are proposed to the SB SR-55/I-5 HOV direct connector and to the NB SR-55/I-405 HOV direct connectors. This alternative maintains auxiliary lane segments identified in the No-Build Alternative (baseline condition) and provides two new auxiliary lanes at locations in the northbound direction listed below.

- NB SR-55 between WB MacArthur Blvd. on-ramp and Dyer Rd. off-ramp
- NB SR-55 between McFadden Ave. on-ramp and NB I-5 connector ramp (new)

In the SB direction, a new GP lane is proposed between the SB I-5 connector ramp and the Edinger Ave. on-ramp, where it would join the auxiliary lane (EA 0G960K) between the Edinger Ave. on-ramp and both the Grand Ave. and Dyer Rd. off-ramps. This new GP lane would remove the baseline weave segment in the SB direction between the SB I-5 connector ramp and the McFadden Ave. off-ramp, while maintaining the existing auxiliary lane between the McFadden Ave. on-ramp and the Edinger Ave. off-ramp.

Table 23:
Design Year (2035) Alternative 5 – Basic Freeway Segment Analysis

Mainline Segment	Lanes	2035 No-Build				Lanes	2035 Alternative 5			
		AM Peak		PM Peak			AM Peak		PM Peak	
		Den.	LOS	Den.	LOS		Den.	LOS	Den.	LOS
NB I-405 to MacArthur Blvd.	4	---	**F**	34.8	D	4	---	**F**	30.8	D
NB MacArthur Blvd. to Dyer Rd.	4	---	**F**	**44.2**	**E**	4	---	**F**	**38.7**	**E**
NB Dyer Rd. to Edinger Ave,	4	---	**F**	---	**F**	4	---	**F**	---	**F**
NB Edinger Ave. to McFadden Ave.	5	29.7	D	**41.4**	**E**	5	34.0	D	**43.6**	**E**
NB McFadden Ave. to I-5	5	**35.2**	**E**	---	**F**	5	29.8	D	**36.8**	**E**
SB I-5 to McFadden Ave.	4	---	**F**	---	**F**	5	---	**F**	34.7	D
SB McFadden Ave. to Edinger Ave.	4	---	**F**	---	**F**	5	---	**F**	34.1	D
SB Edinger Ave. to Grand Ave.	4	---	**F**	---	**F**	5	---	**F**	31.8	D
SB Grand Ave. to Dyer Rd.	4	---	**F**	**41.7**	**E**	4	---	**F**	**42.9**	**E**
SB Dyer Rd. to MacArthur Blvd.	4	---	**F**	---	**F**	4	---	**F**	---	**F**
SB MacArthur Blvd. to I-405	4	---	**F**	---	**F**	4	---	**F**	---	**F**

Notes: Shaded cells indicate LOS E or F; Den. = Density in passenger car equivalents per mile per lane.

6.7.10 Weaving Analysis

The weaving sections for Alternative 1 are identified in **Table 24** below along with the type of weaving section, the number of lanes, and the AM/PM density and LOS results. As can be seen in the table, all of the weave segments are projected to operate at an unacceptable LOS E or F during at least one of the AM/PM peak hours. The only exception is the NB weave segment between the McFadden Ave. on-ramp and the second freeway connector to SB I-5.

Table 24: Design Year (2035) Alternative 1 – Weaving Section Analysis

Weaving Section/Type	2035 No-Build						2035 Alternative 1					
	Type	Lanes	AM Peak		PM Peak		Type	Lanes	AM Peak		PM Peak	
			Den.	LOS	Den.	LOS			Den.	LOS	Den.	LOS
NB I-405 On to MacArthur Blvd. Off	B	5	**39.9**	**E**	29.0	D	B	5	**40.1**	**E**	28.1	D
NB MacArthur Blvd. On to Dyer Rd. Off	N/A	N/A	N/A	N/A	N/A	N/A	A	5	**38.8**	**E**	31.8	D
NB Edinger Ave. On to McFadden Ave. Off	B	5	30.5	D	**35.9**	**E**	B	5	33.9	D	**37.9**	**E**
NB McFadden Ave. On to I-5 NB Off	B	5	**50.3**	**F**	**50.3**	**F**	B	5	**51.0**	**F**	**59.3**	**F**
NB McFadden Ave. On to I-5 SB Off	C	5	20.0	C	20.0	C	C	5	20.3	C	26.2	C
SB SR-55 to McFadden Ave. Off	C	5	**52.7**	**F**	**48.7**	**F**	C	5	**58.7**	**F**	**51.4**	**F**
SB I-5 SB On to McFadden Ave. Off	A	5	**53.3**	**F**	**49.6**	**F**	N/A	N/A	N/A	N/A	N/A	N/A
SB McFadden Ave. On to Edinger Ave. Off	A	5	**52.0**	**F**	**39.6**	**E**	B	6	**45.8**	**F**	30.6	D
SB Dyer Rd. On to MacArthur Blvd. Off	A	5	---	**F**	---	**E**	B	5	**38.6**	**E**	**37.0**	**E**
SB MacArthur Blvd. EB On to SB I-405 Off	B	5	**38.1**	**E**	**39.9**	**E**	B	5	**38.9**	**E**	**40.6**	**E**

Table 25 indicates that the projected operations of the weave sections under the Alternative 2 condition are significantly improved compared to the No-Build Alternative. There is only one section (NB SR-55 between the McFadden Ave. on-ramp and the NB I-5 connector) projected to operate at an unacceptable LOS E or F during both AM and PM peak hours. The SB SR-55 section between the McFadden Ave. on-ramp and the Edinger Ave. off-ramp is projected to operate at LOS F during the AM peak hour. All of the other weaving sections are improved to LOS D or better conditions under the Alternative 2 condition.

Table 25:
Design Year (2035) Alternative 2 – Weaving Section Analysis

Weaving Section Type	2035 No-Build						20350 Alternative 2					
	Type	Lanes	AM Peak		PM Peak		Type	Lanes	AM Peak		PM Peak	
			Den.	LOS	Den.	LOS			Den.	LOS	Den.	LOS
NB I-405 On to MacArthur Blvd. Off	B	5	**39.9**	**E**	29.0	D	B	6	32.1	D	24.7	C
NB Edinger Ave. On to McFadden Ave. Off	B	5	30.5	D	**35.9**	**E**	B	6	24.6	C	32.5	D
NB McFadden Ave. On to I-5 NB Off	B	5	**50.3**	**F**	**50.3**	**F**	C	6	**41.6**	**E**	**53.9**	**F**
NB McFadden Ave. On to I-5 SB Off	C	5	20.0	C	20.0	C	C	6	11.2	B	18.4	B
SB SR-55 to McFadden Off	C	5	**52.7**	**F**	**48.7**	**F**	C	5	**59.8**	**F**	**52.9**	**F**
SB I-5 SB On to McFadden Ave. Off	A	5	**53.3**	**F**	**49.6**	**F**	N/A	N/A	N/A	N/A	N/A	N/A
SB McFadden Ave. On to Edinger Ave. Off	A	5	**52.0**	**F**	**39.6**	**E**	B	6	**46.8**	**F**	30.9	D
SB Dyer Rd. On to MacArthur Blvd. Off	A	5	**---**	**F**	**---**	**E**	N/A	N/A	N/A	N/A	N/A	N/A
SB MacArthur Blvd. EB On to SB I-405 Off	B	5	**38.1**	**E**	**39.9**	**E**	C	6	33.2	D	32.5	D

Table 26 indicates that the projected operations of the weave sections in the Alternative 3 condition are significantly improved compared to the No-Build Alternative. There is only one section (NB SR-55 between the McFadden Ave. on-ramp and the NB I-5 connector) projected to operate at an unacceptable LOS E or F during both AM and PM peak hours. There are two sections (NB SR-55 from WB MacArthur Blvd. on-ramp to Dyer Rd. off-ramp, and SB SR-55 section from McFadden Ave. on-ramp to Edinger Ave. off-ramp) projected to operate at LOS F during the AM peak hour. All of the other weaving sections are improved to LOS D or better conditions under this Alternative 3 condition.

Table 26:
Design Year (2035) Alternative 3 – Weaving Section Analysis

Weaving Section/Type	2035 No-Build						2035 Alternative 3					
			AM Peak		PM Peak				AM Peak		PM Peak	
	Type	Lanes	Den.	LOS	Den.	LOS	Type	Lanes	Den.	LOS	Den.	LOS
NB I-405 On to MacArthur Blvd. Off	B	5	**39.9**	**E**	29.0	D	B	6	33.4	D	25.4	C
NB MacArthur Blvd. WB On to Dyer Rd. Off	N/A	N/A	N/A	N/A	N/A	N/A	A	6	**47.7**	**F**	27.2	C
NB Edinger Ave. On to McFadden Ave. Off	B	5	30.5	D	**35.9**	**E**	B	6	25.1	C	32.3	D
NB McFadden Ave. On to I-5 NB Off	B	5	**50.3**	**F**	**50.3**	**F**	C	6	**42.5**	**E**	**52.5**	**F**
NB McFadden Ave. On to I-5 SB Off	C	5	20.0	C	20.0	C	C	6	9.4	A	17.2	B
SB SR-55 to McFadden Off	C	5	**52.7**	**F**	**48.7**	**F**	C	5	**60.4**	**F**	**52.8**	**F**
SB I-5 SB On to McFadden Ave. Off	A	5	**53.3**	**F**	**49.6**	**F**	N/A	N/A	N/A	N/A	N/A	N/A
SB McFadden Ave. On to Edinger Ave. Off	A	5	**52.0**	**F**	**39.6**	**E**	B	6	**47.8**	**F**	31.8	D
SB Dyer Rd. On to MacArthur Blvd. Off	A	5	**---**	**F**	**---**	**E**	B	6	34.6	D	32.9	D
SB MacArthur Blvd. EB On to SB I-405 Off	B	5	**38.1**	**E**	**39.9**	**E**	C	6	31.0	D	32.9	D

Table 27 indicates that the projected operations of the weave sections under the Alternative 4 condition are significantly improved compared to the No-Build Alternative. The only weaving section with a higher projected density occurs in during PM peak hour at SB SR-55 between McFadden Ave. on-ramp and Edinger Ave. off-ramp. Although the projected densities improve compared to the No-Build Alternative, the only SB section projected to operate at LOS D or better in both peak hours is between the EB MacArthur Blvd. on-ramp and the I-405 SB connector. In the NB direction, one weaving section between McFadden Ave. on-ramp and the I-5 NB connector is projected to operate at LOS E or F during the AM and PM peak hours, respectively.

Table 27: Design Year (2035) Alternative 4– Weaving Section Analysis

Weaving Section/Type	2035 No-Build						2035 Alternative 4					
			AM Peak		PM Peak				AM Peak		PM Peak	
	Type	Lanes	Den.	LOS	Den.	LOS	Type	Lanes	Den.	LOS	Den.	LOS
NB I-405 On to MacArthur Blvd. Off	B	5	**39.9**	**E**	29.0	D	B	6	32.4	D	26.0	C
NB MacArthur Blvd. WB On to Dyer Rd. Off	N/A	N/A	N/A	N/A	N/A	N/A	A	6	30.0	D	26.3	C
NB Edinger Ave. On to McFadden Ave. Off	B	5	30.5	D	**35.9**	**E**	B	6	24.4	C	32.3	D
NB McFadden Ave. On to I-5 NB Off	B	5	**50.3**	**F**	**50.3**	**F**	C	6	**40.4**	**E**	**49.5**	**F**
NB McFadden Ave. On to I-5 SB Off	C	5	20.0	C	20.0	C	C	6	12.5	B	16.6	B
SB SR-55 to McFadden Ave. Off	C	5	**52.7**	**F**	**48.7**	**F**	C	6	**55.1**	**F**	**45.6**	**F**
SB I-5 SB On to McFadden Ave. Off	A	5	**53.3**	**F**	**49.6**	**F**	C	6	**44.1**	**F**	**40.2**	**E**
SB McFadden Ave. On to Edinger Ave. Off	A	5	**52.0**	**F**	**39.6**	**E**	B	6	**45.9**	**F**	**71.4**	**F**
SB Dyer Rd. On to MacArthur Blvd. Off	A	5	**---**	**F**	**---**	**E**	B	6	**36.0**	**E**	32.4	D
SB MacArthur Blvd. EB On to SB I-405 Off	B	5	**38.1**	**E**	**39.9**	**E**	C	6	32.8	D	32.8	D

As can be seen in the **Table 28**, all of the weave segments are projected to operate at an unacceptable LOS E or F during at least one of the AM/PM peak hours. The only exception is the NB weave segment between the McFadden Ave. on-ramp and the freeway connector to SB I-5. In the SB direction, the two weaving sections between McFadden Ave. and MacArthur Blvd. are projected to operate with improved density results compared to the No-Build Alternative.

Table 28: Design Year (2035) Alternative 5 – Weaving Section Analysis

Weaving Section/Type	2035 No-Build						2035 Alternative 5					
			AM Peak		PM Peak				AM Peak		PM Peak	
	Type	Lanes	Den.	LOS	Den.	LOS	Type	Lanes	Den.	LOS	Den.	LOS
NB I-405 On to MacArthur Blvd. Off	B	5	**39.9**	**E**	29.0	D	B	5	**42.2**	**E**	27.6	C
NB MacArthur Blvd. WB On to Dyer Rd. Off	N/A	N/A	N/A	N/A	N/A	N/A	A	5	**41.3**	**E**	31.0	D
NB Edinger Ave. On to McFadden Ave. Off	B	5	30.5	D	**35.9**	**E**	B	5	33.8	D	**38.4**	**E**
NB McFadden Ave. On to I-5 NB Off	B	5	**50.3**	**F**	**50.3**	**F**	C	5	**42.7**	**E**	**50.3**	**F**
NB McFadden Ave. On to I-5 SB Off	C	5	20.0	C	20.0	C	C	5	12.7	B	17.3	B
SB SR-55 to McFadden Off	C	5	**52.7**	**F**	**48.7**	**F**	C	5	**61.1**	**F**	**51.2**	**F**
SB I-5 SB On to McFadden Ave. Off	A	5	**53.3**	**F**	**49.6**	**F**	N/A	N/A	N/A	N/A	N/A	N/A
SB McFadden Ave. On to Edinger Ave. Off	A	5	**52.0**	**F**	**39.6**	**E**	B	6	**43.5**	**F**	29.5	D
SB Dyer Rd. On to MacArthur Blvd. Off	A	5	---	**F**	---	**E**	B	5	**39.8**	**E**	**36.4**	**E**
SB MacArthur Blvd. EB On to SB I-405 Off	B	5	**38.1**	**E**	**39.9**	**E**	B	5	**39.5**	**E**	**40.2**	**E**

6.7.11 Ramp Junction Analysis

Table 29 The ramp junction LOS results for the Alternative 1 condition indicate that each ramp junction is projected to operate at an unacceptable LOS E or F condition in at least one peak hour. The projected hourly ramp volumes at several locations exceed 1,500 passenger car equivalent vehicles (pcph) or fall into the off-ramp category (1500 > volume > 900) where a two-lane ramp should be provided or provisions to be provided in the future. However, most cases in Build (Alternative 1) can not be improved with a 2-lane ramp and associated auxiliary lane since they are analyzed as weaving sections. For instance, the projected peak hour volume at the SB SR-55/Dyer Rd. on-ramp exceeds 1,500 pcph with a single lane ramp, but this is a weaving section.

Table 29:
Design Year (2035) Alternative 1 – Ramp Junction Analysis

Ramp Junction	Year 2035 No-Build				Year 2035 Alternative 1			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Den.	LOS	Den.	LOS	Den.	LOS	Den.	LOS
NB SR-55								
I-405 On-Ramp	Weave Segment				Weave Segment			
MacArthur Blvd. Off-Ramp								
MacArthur Blvd. EB On-Ramp	**30.2**	**F**	24.7	C	**30.6**	**F**	24.4	C
MacArthur Blvd. WB On-Ramp	**33.2**	**F**	26.6	C	Weave Segment			
Dyer Rd. Off-Ramp	**51.0**	**F**	**39.0**	**E**				
Dyer Rd. EB On-Ramp	28.3	D	**27.5**	**F**	**29.0**	**F**	**27.7**	**F**
Dyer Rd. WB On-Ramp	**30.5**	**F**	**28.7**	**F**	**68.2**	**F**	**68.0**	**F**
Edinger Ave. Off-Ramp	**44.1**	**F**	**50.4**	**F**	**---**	**F**	**---**	**F**
Edinger Ave. On-Ramp	Weave Segment				Weave Segment			
McFadden Ave. Off-Ramp								
McFadden Ave. On-Ramp	Weave Segment				Weave Segment			
I-5 NB Off-Ramp								
I-5 SB Off-Ramp								
SB SR-55								
I-5 SB On-Ramp	Weave Segment				**36.4**	**F**	**30.6**	**F**
McFadden Ave. Off-Ramp					**40.6**	**E**	**38.4**	**E**
McFadden Ave. On-Ramp	Weave Segment				Weave Segment			
Edinger Ave. Off-Ramp								
Edinger Ave. On-Ramp	**33.8**	**F**	**28.5**	**F**	**31.2**	**F**	24.5	C
Grand Ave. Off-Ramp	**51.4**	**F**	**43.0**	**F**	**44.8**	**F**	**38.0**	**E**
Dyer Rd. Off-Ramp	**48.6**	**F**	**39.2**	**E**	**33.7**	**F**	**25.3**	**F**
Dyer Rd. On-Ramp	Weave Segment				Weave Segment			
MacArthur Blvd. Off-Ramp								
MacArthur Blvd. WB On-Ramp	28.2	D	**28.7**	**F**	29.4	D	**30.3**	**F**
MacArthur Blvd. EB On-Ramp	Weave Segment				Weave Segment			
I-405 On-Ramp								

Table 30 Ramp junction modifications related to this alternative include: reducing two SB two-lane exits (McFadden Ave. and MacArthur Blvd.) to single lane exits.

The ramp junction LOS results for the Alternative 2 condition indicate that each ramp junction is projected to operate at an unacceptable LOS E or F condition in at least one peak hour except the following on-ramp locations:

- NB SR-55/EB MacArthur Blvd. On-Ramp,
- NB SR-55/WB MacArthur Blvd. On-Ramp,
- NB SR-55/EB Dyer Rd. On-Ramp,
- SB SR-55/Dyer Rd. On-Ramp, and
- SB SR-55/WB MacArthur Blvd. On-Ramp.

Table 30: Design Year (2035) Alternative 2 – Ramp Junction Analysis

Ramp Junction	Year 2035 No-Build				Year 2035 Alternative 2			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Den.	LOS	Den.	LOS	Den.	LOS	Den.	LOS
NB SR-55								
I-405 On-Ramp	Weave Segment				Weave Segment			
MacArthur Blvd. Off-Ramp								
MacArthur Blvd. EB On-Ramp	**30.2**	**F**	24.7	C	25.5	C	21.1	C
MacArthur Blvd. WB On-Ramp	**33.2**	**F**	26.6	C	27.8	C	17.7	B
Dyer Rd. Off-Ramp	**51.0**	**F**	**39.0**	**E**	**44.9**	**F**	**37.3**	**E**
Dyer Rd. EB On-Ramp	28.3	D	**27.5**	**F**	24.0	C	25.6	C
Dyer Rd. WB On-Ramp	**30.5**	**F**	**28.7**	**F**	25.6	C	**26.9**	**F**
Edinger Ave. Off-Ramp	**44.1**	**F**	**50.4**	**F**	**38.6**	**E**	**45.4**	**F**
Edinger Ave. On-Ramp	Weave Segment				Weave Segment			
McFadden Ave. Off-Ramp								
McFadden Ave. On-Ramp	Weave Segment				Weave Segment			
I-5 NB Off-Ramp								
I-5 SB Off-Ramp								
SB SR-55								
I-5 SB On-Ramp	Weave Segment				**37.1**	**F**	**31.4**	**F**
McFadden Ave. Off-Ramp					**40.8**	**E**	**38.8**	**E**
McFadden Ave. On-Ramp	Weave Segment				Weave Segment			
Edinger Ave. Off-Ramp								
Edinger Ave. On-Ramp	**33.8**	**F**	**28.5**	**F**	**31.6**	**F**	24.9	C
Grand Ave. Off-Ramp	**51.4**	**F**	**43.0**	**F**	**46.3**	**F**	**38.5**	**E**
Dyer Rd. Off-Ramp	**48.6**	**F**	**39.2**	**E**	**43.2**	**F**	**35.2**	**E**
Dyer Rd. On-Ramp	Weave Segment				27.5	C	24.5	C
MacArthur Blvd. Off-Ramp					**47.8**	**F**	**42.2**	**F**
MacArthur Blvd. WB On-Ramp	28.2	D	**28.7**	**F**	23.2	C	25.0	C
MacArthur Blvd. EB On-Ramp	Weave Segment				Weave Segment			
I-405 On-Ramp								

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Table 31 Ramp junction modifications related to this alternative include: a two-lane exit from NB SR-55 to Edinger Ave., and reducing two SB two-lane exits (McFadden Ave. and MacArthur Blvd.) to single lane exits.

The ramp junction LOS results for the Alternative 3 condition, presented in Table 32, indicate that each ramp junction is projected to operate at an unacceptable LOS E or F condition in at least one peak hour except the following on-ramp locations:

- NB SR-55/EB MacArthur Blvd. On-Ramp
- NB SR-55/EB Dyer Rd. On-Ramp
- SB SR-55/WB MacArthur Blvd. On-Ramp

Table 31: Design Year (2035) Alternative 3 – Ramp Junction Analysis

Ramp Junction	Year 2035 No-Build				Year 2035 Alternative 3			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Den.	LOS	Den.	LOS	Den.	LOS	Den.	LOS
NB SR-55								
I-405 On-Ramp	Weave Segment				Weave Segment			
MacArthur Blvd. Off-Ramp								
MacArthur Blvd. EB On-Ramp	**30.2**	**F**	24.7	C	26.1	C	21.4	C
MacArthur Blvd. WB On-Ramp	**33.2**	**F**	26.6	C	Weave Segment			
Dyer Rd. Off-Ramp	**51.0**	**F**	**39.0**	**E**				
Dyer Rd. EB On-Ramp	28.3	D	**27.5**	**F**	24.7	C	25.8	C
Dyer Rd. WB On-Ramp	**30.5**	**F**	**28.7**	**F**	**53.3**	**F**	**60.5**	**F**
Edinger Ave. Off-Ramp	**44.1**	**F**	**50.4**	**F**	---	A	---	**F**
Edinger Ave. On-Ramp	Weave Segment				Weave Segment			
McFadden Ave. Off-Ramp								
McFadden Ave. On-Ramp	Weave Segment				Weave Segment			
I-5 NB Off-Ramp								
I-5 SB Off-Ramp								
SB SR-55								
I-5 SB On-Ramp	Weave Segment				**37.0**	**F**	**31.5**	**F**
McFadden Ave. Off-Ramp					**41.0**	**F**	**38.9**	**E**
McFadden Ave. On-Ramp	Weave Segment				Weave Segment			
Edinger Ave. Off-Ramp								
Edinger Ave. On-Ramp	**33.8**	**F**	**28.5**	**F**	**67.3**	**F**	**47.1**	**F**
Grand Ave. Off-Ramp	**51.4**	**F**	**43.0**	**F**	**25.6**	**F**	18.1	B
Dyer Rd. Off-Ramp	**48.6**	**F**	**39.2**	**E**	**26.9**	**F**	19.0	B
Dyer Rd. On-Ramp	Weave Segment				Weave Segment			
MacArthur Blvd. Off-Ramp								
MacArthur Blvd. WB On-Ramp	28.2	D	**28.7**	**F**	23.2	C	25.1	C
MacArthur Blvd. EB On-Ramp	Weave Segment				Weave Segment			
I-405 On-Ramp								

Table 32 Ramp junction modifications related to this alternative include: a two-lane exit from NB SR-55 to Edinger Ave., and reducing two SB two-lane exits (McFadden Ave. and MacArthur Blvd.) to single lane exits.

The ramp junction LOS results for Alternative 4 are presented in Table 33. Several ramp junctions that are projected to operate with improved densities in the Alternative 4 compared to the No-Build Alternative although the LOS designation remains at LOS E or F in at least one peak hour. However, the three on-ramp locations below are projected to operate at LOS C or better in the design year (2035).

- NB SR-55/EB MacArthur Blvd. On-Ramp
- NB SR-55/EB Dyer Rd. On-Ramp
- SB SR-55/WB MacArthur Blvd. On-Ramp

Table 32: Design Year (2035) Alternative 4 – Ramp Junction Analysis

Ramp Junction	Year 2035 No-Build				Year 2035 Alternative 4			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Den.	LOS	Den.	LOS	Den.	LOS	Den.	LOS
NB SR-55								
I-405 On-Ramp	Weave Segment				Weave Segment			
MacArthur Blvd. Off-Ramp								
MacArthur Blvd. EB On-Ramp	**30.2**	**F**	24.7	C	25.6	C	21.2	C
MacArthur Blvd. WB On-Ramp	**33.2**	**F**	26.6	C	Weave Segment			
Dyer Rd. Off-Ramp	**51.0**	**F**	**39.0**	**E**				
Dyer Rd. EB On-Ramp	28.3	D	**27.5**	**F**	24.2	C	25.3	C
Dyer Rd. WB On-Ramp	**30.5**	**F**	**28.7**	**F**	**51.8**	**F**	**58.4**	**F**
Edinger Ave. Off-Ramp	**44.1**	**F**	**50.4**	**F**	---	A	---	**F**
Edinger Ave. On-Ramp	Weave Segment				Weave Segment			
McFadden Ave. Off-Ramp								
McFadden Ave. On-Ramp	Weave Segment				Weave Segment			
I-5 NB Off-Ramp								
I-5 SB Off-Ramp								
SB SR-55								
I-5 SB On-Ramp	Weave Segment				Weave Segment			
McFadden Ave. Off-Ramp								
McFadden Ave. On-Ramp	Weave Segment				Weave Segment			
Edinger Ave. Off-Ramp								
Edinger Ave. On-Ramp	**33.8**	**F**	**28.5**	**F**	**62.0**	**F**	**45.8**	**F**
Grand Ave. Off-Ramp	**51.4**	**F**	**43.0**	**F**	**25.3**	**F**	17.5	B
Dyer Rd. Off-Ramp	**48.6**	**F**	**39.2**	**E**	**26.4**	**F**	18.2	B
Dyer Rd. On-Ramp	Weave Segment				Weave Segment			
MacArthur Blvd. Off-Ramp								
MacArthur Blvd. WB On-Ramp	28.2	D	**28.7**	**F**	24.1	C	24.7	C
MacArthur Blvd. EB On-Ramp	Weave Segment				Weave Segment			
I-405 On-Ramp								

Table 33 Ramp junction modifications related to Alternative 5 include: a two-lane exit from NB SR-55 to Edinger Ave., and reducing the SB two-lane exit at McFadden Ave. to a single lane exit.

As can be seen in Table 34, the ramp junction LOS results indicate that all ramp junctions are projected to operate at an unacceptable LOS E or F during at least one peak hour in the Alternative 5 condition. Overall, nearly all ramp junctions are projected to have higher density results compared to the No-Build Alternative.

Table 33:
Design Year (2035) Alternative 5 – Ramp Junction Analysis

Ramp Junction	Year 2035 No-Build				Year 2035 Alternative 5			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Den.	LOS	Den.	LOS	Den.	LOS	Den.	LOS
NB SR-55								
I-405 On-Ramp	Weave Segment				Weave Segment			
MacArthur Blvd. Off-Ramp								
MacArthur Blvd. EB On-Ramp	**30.2**	**F**	24.7	C	**31.7**	**F**	23.6	C
MacArthur Blvd. WB On-Ramp	**33.2**	**F**	26.6	C	Weave Segment			
Dyer Rd. Off-Ramp	**51.0**	**F**	**39.0**	**E**				
Dyer Rd. EB On-Ramp	28.3	D	**27.5**	**F**	**30.1**	**F**	**27.3**	**F**
Dyer Rd. WB On-Ramp	**30.5**	**F**	**28.7**	**F**	**72.2**	**F**	**66.6**	**F**
Edinger Ave. Off-Ramp	**44.1**	**F**	**50.4**	**F**	**---**	**F**	**---**	**F**
Edinger Ave. On-Ramp	Weave Segment				Weave Segment			
McFadden Ave. Off-Ramp								
McFadden Ave. On-Ramp	Weave Segment				Weave Segment			
I-5 NB Off-Ramp								
I-5 SB Off-Ramp								
SB SR-55								
I-5 SB On-Ramp	Weave Segment				**37.8**	**F**	**30.2**	**F**
McFadden Ave. Off-Ramp					**39.8**	**E**	**37.9**	**E**
McFadden Ave. On-Ramp	Weave Segment				Weave Segment			
Edinger Ave. Off-Ramp								
Edinger Ave. On-Ramp	**33.8**	**F**	**28.5**	**F**	**29.3**	**F**	24.0	C
Grand Ave. Off-Ramp	**51.4**	**F**	**43.0**	**F**	**44.9**	**F**	**37.3**	**E**
Dyer Rd. Off-Ramp	**48.6**	**F**	**39.2**	**E**	**34.3**	**F**	**24.6**	**F**
Dyer Rd. On-Ramp	Weave Segment				Weave Segment			
MacArthur Blvd. Off-Ramp								
MacArthur Blvd. WB On-Ramp	28.2	D	**28.7**	**F**	29.8	D	**29.7**	**F**
MacArthur Blvd. EB On-Ramp	Weave Segment				Weave Segment			
I-405 On-Ramp								

Notes:
Shaded cells indicate LOS E or F.
Den. = Density in passenger car equivalents per mile per lane.

6.7.12 HOV Analysis

Table 34 presents the HOV analysis for the design year (2035) Alternative 1 within the study corridor. As can be seen in the table, most of the HOV segments are projected to operate with v/c ratios under 1.00 under the design year (2035) Alternative 1 except at the SB segments between McFadden Ave. and Dyer Rd. during the AM Peak Hour.

Table 34:
Design Year (2035) Alternative 1 – HOV Lane Analysis

HOV Segment	2035 No-Build					2035 Alternative 1				
	HOV Lanes	AM Peak		PM Peak		HOV Lanes	AM Peak		PM Peak	
		Vol.	V/C	Vol.	V/C		Vol.	V/C	Vol.	V/C
NB I-405 to MacArthur Blvd.	1	900	0.41	1635	0.74	1	1210	0.55	1570	0.71
NB MacArthur Blvd. to Alton Ave. HOV Ramps	2	920	0.21	1860	0.42	2	1225	0.28	1670	0.38
NB Alton Ave. HOV Ramps to Dyer Rd.	2	870	0.20	1830	0.42	2	1160	0.26	1385	0.31
NB Dyer Rd. to Edinger Ave,	1	1030	0.47	**2220**	**1.01**	1	1050	0.48	2075	0.94
NB Edinger Ave. to McFadden Ave.	1	1030	0.47	**2220**	**1.01**	1	1050	0.48	2075	0.94
NB McFadden Ave. to I-5	2	1180	0.27	2780	0.63	2	1195	0.27	2825	0.64
SB I-5 to McFadden Ave.	2	1995	0.45	1095	0.25	2	2110	0.48	1030	0.23
SB McFadden Ave. to Edinger Ave.	1	**2380**	**1.08**	1430	0.65	1	**2330**	**1.06**	1555	0.71
SB Edinger Ave. to Grand Ave.	1	**2380**	**1.08**	1430	0.65	1	**2330**	**1.06**	1555	0.71
SB Grand Ave. to Dyer Rd.	1	**2450**	**1.11**	1435	0.65	1	**3025**	**1.38**	1560	0.71
SB Dyer Rd. to Alton Ave. HOV Ramps	2	1850	0.42	1285	0.29	2	2265	0.51	1515	0.34
SB Alton Ave. HOV Ramps to MacArthur Blvd.	2	2310	0.53	1345	0.31	2	1935	0.44	1595	0.36
SB MacArthur Blvd. to I-405	2	1710	0.39	1115	0.25	2	1515	0.34	1405	0.32

Notes:
Shaded cells indicate v/c > 1.00.

Similar to the No-Build scenario, the three HOV merge locations presented in **Table 35** were analyzed within the corridor using a modified ramp merge analysis combining the estimated volume in the number one lane adjacent to the HOV lane and the SR-55 HOV volume so a two-lane analysis could be conducted with a single lane merging volume from I-5 or the Alton Ave. OC and HOV drop ramps, which occurs from the left hand side. The table presents the LOS results for the HOV merge locations within the corridor along with the LOS results from the No-Build condition for comparison purposes.

The LOS results indicate that the HOV merge locations will operate at an unacceptable E or F in at least one peak hour under the Build condition. Although the mainline and HOV volumes are higher in the Build condition than the No-Build condition, the Build condition provides geometric improvements such as additional lanes (i.e., auxiliary, GP, HOV), as well as improving the taper length at the SB SR-55/SB I-5 HOV merge location. The taper length increases from the 30:1 taper (360') in the No-Build condition to an 80:1 taper (960') in the Build condition. Additionally, the Build condition provides a new GP lane within the 5/55 HOV merge area that provides an additional lane for the distribution of the GP lane volumes.

Table 35: Design Year (2035) Alternative 1 – HOV Merge Analysis

HOV Merge Location	Year 2035 No-Build				Year 2035 Alternative 1			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Den.	LOS	Den.	LOS	Den.	LOS	Den.	LOS
SB SR-55/ SB I-5 HOV	**51.5**	**F**	**37.6**	**E**	**47.4**	**F**	30.8	D
SB SR-55/ SB Alton Ave. OC and HOV Drop Ramp	34.3	D	**35.7**	**E**	34.3	D	**37.3**	**E**
NB SR-55/ NB Alton Ave. OC and HOV Drop Ramp	30.6	D	**40.0**	**F**	30.6	D	**38.8**	**F**

Notes:
Shaded cells indicate LOS E or F.
Den. = Density in passenger car equivalents per mile per lane.

Table 36 presents the HOV analysis for the design year (2035) Alternative 2 within the study corridor. The table indicates that most of the HOV segments are projected to operate with v/c ratios under 1.00 under the design year (2035) Alternative 2 condition except the three SB segments between McFadden Ave. and Dyer Rd. during the AM Peak Hour.

Table 36: Design Year (2035) Alternative 2 – HOV Lane Analysis

HOV Segment	2035 No-Build					2035 Alternative 2				
	HOV Lanes	AM Peak		PM Peak		HOV Lanes	AM Peak		PM Peak	
		Vol.	V/C	Vol.	V/C		Vol.	V/C	Vol.	V/C
NB I-405 to MacArthur Blvd.	1	900	0.41	1635	0.74	1	1180	0.54	1500	0.68
NB MacArthur Blvd. to Alton Ave. HOV Ramps	2	920	0.21	1860	0.42	2	1195	0.27	1625	0.37
NB Alton Ave. HOV Ramps to Dyer Rd.	2	870	0.20	1830	0.42	2	1190	0.27	1380	0.31
NB Dyer Rd. to Edinger Ave,	1	1030	0.47	**2220**	**1.01**	1	1015	0.46	2150	0.98
NB Edinger Ave. to McFadden Ave.	1	1030	0.47	**2220**	**1.01**	1	1015	0.46	2150	0.98
NB McFadden Ave. to I-5	2	1180	0.27	2780	0.63	2	1190	0.27	2920	0.66
SB I-5 to McFadden Ave.	2	1995	0.45	1095	0.25	2	2155	0.49	1090	0.25
SB McFadden Ave. to Edinger Ave.	1	**2380**	**1.08**	1430	0.65	1	**2335**	**1.06**	1555	0.71
SB Edinger Ave. to Grand Ave.	1	**2380**	**1.08**	1430	0.65	1	**2335**	**1.06**	1555	0.71
SB Grand Ave. to Dyer Rd.	1	**2450**	**1.11**	1435	0.65	1	**2745**	**1.25**	1555	0.71
SB Dyer Rd. to Alton Ave. HOV Ramps	2	1850	0.42	1285	0.29	2	2125	0.48	1405	0.32
SB Alton Ave. HOV Ramps to MacArthur Blvd.	2	2310	0.53	1345	0.31	2	1765	0.40	1470	0.33
SB MacArthur Blvd. to I-405	2	1710	0.39	1115	0.25	2	1505	0.34	1380	0.31

Notes:
Shaded cells indicate v/c > 1.00.

Similar to the No-Build scenario, the three HOV merge locations presented in **Table 37** were analyzed within the corridor using a modified ramp merge analysis combining the estimated volume in the number one lane adjacent to the HOV lane and the SR-55 HOV volume so a two-lane analysis could be conducted with a single lane merging volume from I-5 or the Alton Ave. and HOV drop ramps, which occurs from the left hand side. The table presents the LOS results for the HOV merge locations within the corridor along with the LOS results from the No-Build condition for comparison purposes.

The LOS results indicate that the HOV merge locations will operate at an unacceptable E or F in at least one peak hour under the Build condition, except for the SB Alton Ave. OC and HOV Drop Ramp location. Although the mainline and HOV volumes are higher in the Build condition than the No-Build condition, the density decreases in the Build condition that provides geometric improvements such as additional lanes (i.e., auxiliary, GP, HOV), as well as improving the taper length at the SB SR-55/SB I-5 HOV merge location. The taper length increases from the 30:1 taper (360') in the No-Build condition to an 80:1 taper (960') in the Build condition. Additionally, the Build condition provides a new GP lane within the SB 5/55 HOV merge area and both the Alton Ave. OC and HOV Drop Ramp merge areas that provide for an additional lane for the distribution of the GP lane volumes.

The LOS results indicate that the HOV merge locations will operate at an unacceptable E or F in at least one peak hour under the Build condition, except for the SB Alton Ave. OC and HOV Drop Ramp location. Although the mainline and HOV volumes are higher in the Build condition than the No-Build condition, the density decreases in the Build condition that provides geometric improvements such as additional lanes (i.e., auxiliary, GP, HOV), as well as improving the taper length at the SB SR-55/SB I-5 HOV merge location. The taper length increases from the 30:1 taper (360') in the No-Build condition to an 80:1 taper (960') in the Build condition. Additionally, the Build condition provides a new GP lane within the SB 5/55 HOV merge area and both the Alton Ave. OC and HOV Drop Ramp merge areas that provide for an additional lane for the distribution of the GP lane volumes.

Table 37: Design Year (2035) Alternative 2 – HOV Merge Analysis

HOV Merge Location	Year 2035 No-Build				Year 2035 Alternative 2			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Den.	LOS	Den.	LOS	Den.	LOS	Den.	LOS
SB SR-55/ SB I-5 HOV	**51.5**	**F**	**37.6**	**E**	**48.5**	**F**	31.3	D
SB SR-55/ SB Alton Ave. OC and HOV Drop Ramp	34.3	D	**35.7**	**E**	26.1	C	29.9	D

The LOS results indicate that the HOV merge locations will operate at an unacceptable E or F in at least one peak hour under the Build condition, except for the SB Alton Ave. OC and HOV Drop Ramp location. Although the mainline and HOV volumes are higher in the Build condition than the No-Build condition, the density decreases in the Build condition that provides geometric improvements such as additional lanes (i.e., auxiliary, GP, HOV), as well as improving the taper length at the SB SR-55/SB I-5 HOV merge location. The taper length increases from the 30:1 taper (360') in the No-Build condition to an 80:1 taper (960') in the Build condition. Additionally, the Build condition provides a new GP lane within the SB 5/55 HOV merge area and both the Alton Ave. OC and HOV Drop Ramp merge areas that provide for an additional lane for the distribution of the GP lane volumes.

The LOS results indicate that the HOV merge locations will operate at an unacceptable E or F in at least one peak hour under the Build condition, except for the SB Alton Ave. OC and HOV Drop Ramp location. Although the mainline and HOV volumes are higher in the Build condition than the No-Build condition, the density decreases in the Build condition that provides geometric improvements such as additional lanes (i.e., auxiliary, GP, HOV), as well as improving the taper length at the SB SR-55/SB I-5 HOV merge location. The taper length increases from the 30:1 taper (360') in the No-Build condition to an 80:1 taper (960') in the Build condition. Additionally, the Build condition provides a new GP lane within the SB 5/55 HOV merge area and both the Alton Ave. OC and HOV Drop Ramp merge areas that provide for an additional lane for the distribution of the GP lane volumes.

Table 37: Design Year (2035) Alternative 2 – HOV Merge Analysis

HOV Merge Location	Year 2035 No-Build				Year 2035 Alternative 2			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Den.	LOS	Den.	LOS	Den.	LOS	Den.	LOS
NB SR-55/ NB Alton Ave. OC and HOV Drop Ramp	30.6	D	**40.0**	**F**	26.3	C	**36.3**	**E**

Notes: Shaded cells indicate LOS E or F. Den. = Density in passenger car equivalents per mile per lane.

Table 38 presents the HOV analysis for the design year (2035) Alternative 3 within the study corridor. The table indicates that most of the HOV segments are projected to operate with v/c ratios under 1.00 under the design year (2035) Alternative 3 condition except the four SB segments between McFadden Ave. and Dyer Rd. during the AM peak hour.

Table 38:
Design Year (2035) Alternative 3 – HOV Lane Analysis

HOV Segment	2035 No-Build					2035 Alternative 3				
	HOV Lanes	AM Peak		PM Peak		HOV Lanes	AM Peak		PM Peak	
		Vol.	V/C	Vol.	V/C		Vol.	V/C	Vol.	V/C
NB I-405 to MacArthur Blvd.	1	900	0.41	1635	0.74	1	1155	0.52	1435	0.65
NB MacArthur Blvd. to Alton Ave. HOV Ramps	2	920	0.21	1860	0.42	2	1195	0.27	1525	0.35
NB Alton Ave. HOV Ramps to Dyer Rd.	2	870	0.20	1830	0.42	2	1190	0.27	1215	0.28
NB Dyer Rd. to Edinger Ave,	1	1030	0.47	**2220**	**1.01**	1	1020	0.46	1985	0.90
NB Edinger Ave. to McFadden Ave.	1	1030	0.47	**2220**	**1.01**	1	1020	0.46	1985	0.90
NB McFadden Ave. to I-5	2	1180	0.27	2780	0.63	2	1165	0.26	2925	0.66
SB I-5 to McFadden Ave.	2	1995	0.45	1095	0.25	2	2150	0.49	1090	0.25
SB McFadden Ave. to Edinger Ave.	1	**2380**	**1.08**	1430	0.65	1	**2305**	**1.05**	1540	0.70
SB Edinger Ave. to Grand Ave.	1	**2380**	**1.08**	1430	0.65	1	**2305**	**1.05**	1540	0.70
SB Grand Ave. to Dyer Rd.	1	**2450**	**1.11**	1435	0.65	1	**2840**	**1.29**	1545	0.70
SB Dyer Rd. to Alton Ave. HOV Ramps	2	1850	0.42	1285	0.29	2	2240	0.56	1435	0.33
SB Alton Ave. HOV Ramps to MacArthur Blvd.	2	2310	0.53	1345	0.31	2	1825	0.41	1530	0.35
SB MacArthur Blvd. to I-405	2	1710	0.39	1115	0.25	2	1505	0.34	1385	0.31

Similar to the No-Build scenario, the three HOV merge locations presented in **Table 39** were analyzed within the corridor using a modified ramp merge analysis combining the estimated volume in the number one lane adjacent to the HOV lane and the SR-55 HOV volume so a two-lane analysis could be conducted with a single lane merging volume from I-5 or the Alton Ave. OC and HOV drop ramps, which occurs from the left hand side. The table presents the LOS results for the HOV merge locations within the corridor along with the LOS results from the No-Build condition for comparison purposes.

The LOS results indicate that the HOV merge locations will operate at an unacceptable E or F in at least one peak hour under the Build condition, except for the SB Alton Ave. OC and HOV Drop Ramp location. Although the mainline and HOV volumes are higher in the Build condition than the No-Build condition, the density decreases in the Build condition that provides geometric improvements such as additional lanes (i.e., auxiliary, GP, HOV), as well as improving the taper length at the SB SR-55/SB I-5 HOV merge location. The taper length increases from the 30:1 taper (360') in the No-Build condition to an 80:1 taper (960') in the Build condition. Additionally, the Build condition provides a new GP lane within the SB 5/55 HOV merge area and both the Alton Ave. OC and HOV Drop Ramp merge areas that provide for an additional lane for the distribution of the GP lane volumes.

Table 39: Design Year (2035) Alternative 3 – HOV Merge Analysis

HOV Merge Location	Year 2035 No-Build				Year 2035 Alternative 3			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Den.	LOS	Den.	LOS	Den.	LOS	Den.	LOS
SB SR-55/ SB I-5 HOV	**51.5**	**F**	**37.6**	**E**	**47.8**	**F**	31.0	D
SB SR-55/ SB Alton Ave. OC and HOV Drop Ramp	34.3	D	**35.7**	**E**	26.9	C	30.3	D
NB SR-55/ NB Alton Ave. OC and HOV Drop Ramp	30.6	D	**40.0**	**F**	26.6	C	**35.5**	**E**

Table 40 presents the HOV analysis for the design year (2035) Alternative 4 within the study corridor. The table indicates that all of the HOV segments are projected to operate with v/c ratios under 1.00 under the design year (2035) Alternative 4 condition due to the HOV lane improvements.

Table 40: Design Year (2035) Alternative 4 – HOV Lane Analysis

HOV Segment	2035 No-Build					2035 Alternative 4				
	HOV Lanes	AM Peak		PM Peak		HOV Lanes	AM Peak		PM Peak	
		Vol.	V/C	Vol.	V/C		Vol.	V/C	Vol.	V/C
NB I-405 to MacArthur Blvd.	1	900	0.41	1635	0.74	1	1185	0.54	1910	0.87
NB MacArthur Blvd. to Alton Ave. HOV Ramps	2	920	0.21	1860	0.42	2	1200	0.27	2060	0.47
NB Alton Ave. HOV Ramps to Dyer Rd.	2	870	0.20	1830	0.42	2	1165	0.26	2010	0.46
NB Dyer Rd. to Edinger Ave,	1	1030	0.47	**2220**	**1.01**	2	1080	0.25	3200	0.73
NB Edinger Ave. to McFadden Ave.	1	1030	0.47	**2220**	**1.01**	2	1080	0.25	3200	0.73
NB McFadden Ave. to I-5	2	1180	0.27	2780	0.63	2	1150	0.26	3655	0.83
SB I-5 to McFadden Ave.	2	1995	0.45	1095	0.25	2	2240	0.51	1065	0.24
SB McFadden Ave. to Edinger Ave.	1	**2380**	**1.08**	1430	0.65	2	3860	0.88	1720	0.39
SB Edinger Ave. to Grand Ave.	1	**2380**	**1.08**	1430	0.65	2	3860	0.88	1720	0.39
SB Grand Ave. to Dyer Rd.	1	**2450**	**1.11**	1435	0.65	2	3860	0.88	1720	0.39
SB Dyer Rd. to Alton Ave. HOV Ramps	2	1850	0.42	1285	0.29	2	3805	0.86	1695	0.39
SB Alton Ave. HOV Ramps to MacArthur Blvd.	2	2310	0.53	1345	0.31	2	2140	0.49	1635	0.37
SB MacArthur Blvd. to I-405	2	1710	0.39	1115	0.25	2	1715	0.39	1420	0.32

Similar to the No-Build scenario, the three HOV merge locations presented in **Table 41** were analyzed within the corridor using a modified ramp merge analysis combining the estimated volume in the number one lane adjacent to the HOV lane and the SR-55 HOV volume so a two-lane analysis could be conducted with a single lane merging volume from I-5 or the Alton Ave. OC and HOV drop ramps, which occurs from the left hand side. The table presents the LOS results for the HOV merge locations within the corridor along with the LOS results from the No-Build condition for comparison purposes.

Although the mainline and HOV volumes are higher in the Build condition than the No-Build condition, this Build condition provides several geometric improvements such as additional lanes (i.e., auxiliary, GP, and HOV). The additional HOV lane eliminates the merge at two of the three locations. The LOS results indicate that the only HOV merge location will operate at an unacceptable F in the AM peak hour under the Build condition due to the increased volumes in the HOV lane.

Table 41: Design Year (2035) Alternative 4 – HOV Merge Analysis

HOV Merge Location	Year 2035 No-Build				Year 2035 Alternative 4			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Den.	LOS	Den.	LOS	Den.	LOS	Den.	LOS
SB SR-55/ SB I-5 HOV	**51.5**	**F**	**37.6**	**E**	N/A	N/A	N/A	N/A
SB SR-55/ SB Alton Ave. OC and HOV Drop Ramp	34.3	D	**35.7**	**E**	**37.7**	**F**	31.7	D
NB SR-55/ NB Alton Ave. OC and HOV Drop Ramp	30.6	D	**40.0**	**F**	N/A	N/A	N/A	N/A

Notes:
Shaded cells indicate LOS E or F.
Den. = Density in passenger car equivalents per mile per lane.

Table 42 presents the HOV analysis for the design year (2035) Alternative 5 within the study corridor. The table indicates that all of the HOV segments are projected to operate with v/c ratios under 1.00 under the design year (2035) Alternative 5 condition due to the HOV lane improvements. This is a significant improvement over the No-Build Alternative, especially for the segments in the SB direction between McFadden Ave. and Dyer Rd. that had projected v/c ratios exceeding 1.0.

Table 42: Design Year (2035) Alternative 5 – HOV Lane Analysis

HOV Segment	2035 No-Build					2035 Alternative 5				
	HOV Lanes	AM Peak		PM Peak		HOV Lanes	AM Peak		PM Peak	
		Vol.	V/C	Vol.	V/C		Vol.	V/C	Vol.	V/C
NB I-405 to MacArthur Blvd.	1	900	0.41	1635	0.74	1	1185	0.54	1910	0.87
NB MacArthur Blvd. to Alton Ave. HOV Ramps	2	920	0.21	1860	0.42	2	1200	0.27	2055	0.47
NB Alton Ave. HOV Ramps to Dyer Rd.	2	870	0.20	1830	0.42	2	1155	0.26	2010	0.46
NB Dyer Rd. to Edinger Ave,	1	1030	0.47	**2220**	**1.01**	2	1130	0.26	3090	0.70
NB Edinger Ave. to McFadden Ave.	1	1030	0.47	**2220**	**1.01**	2	1130	0.26	3090	0.70
NB McFadden Ave. to I-5	2	1180	0.27	2780	0.63	2	1145	0.26	3130	0.71
SB I-5 to McFadden Ave.	2	1995	0.45	1095	0.25	2	2240	0.51	1065	0.24
SB McFadden Ave. to Edinger Ave.	1	**2380**	**1.08**	1430	0.65	2	3880	0.88	1725	0.39
SB Edinger Ave. to Grand Ave.	1	**2380**	**1.08**	1430	0.65	2	3880	0.88	1725	0.39
SB Grand Ave. to Dyer Rd.	1	**2450**	**1.11**	1435	0.65	2	3890	0.88	1730	0.39
SB Dyer Rd. to Alton Ave. HOV Ramps	2	1850	0.42	1285	0.29	2	3830	0.87	1705	0.39
SB Alton Ave. HOV Ramps to MacArthur Blvd.	2	2310	0.53	1345	0.31	2	2155	0.49	1655	0.38
SB MacArthur Blvd. to I-405	2	1710	0.39	1115	0.25	2	1740	0.40	1445	0.33

Similar to the No-Build scenario, the three HOV merge locations presented in **Table 43** were analyzed within the corridor using a modified ramp merge analysis combining the estimated volume in the number one lane adjacent to the HOV lane and the SR-55 HOV volume so a two-lane analysis could be conducted with a single lane merging volume from I-5 or the Alton Ave. OC and HOV drop ramps, which occurs from the left hand side. The table presents the LOS results for the HOV merge locations within the corridor along with the LOS results from the No-Build condition for comparison purposes.

Although the mainline and HOV volumes are higher in the Build condition than the No-Build condition, this Build condition provides several geometric improvements such as additional lanes (i.e., auxiliary and HOV). The additional HOV lane eliminates the merge at two of the three locations. The LOS results indicate that the only HOV merge location will operate at an unacceptable F in both peak hours under the Build condition due to the increased volumes in the HOV lane.

Table 43: Design Year (2035) Alternative 5 – HOV Merge Analysis

HOV Merge Location	Year 2035 No-Build				Year 2035 Alternative 5			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Den.	LOS	Den.	LOS	Den.	LOS	Den.	LOS
SB SR-55/ SB I-5 HOV	**51.5**	**F**	**37.6**	**E**	N/A	N/A	N/A	N/A
SB SR-55/ SB Alton Ave. OC and HOV Drop Ramp	34.3	D	**35.7**	**E**	**43.9**	**F**	**37.9**	**F**
NB SR-55/ NB Alton Ave. OC and HOV Drop Ramp	30.6	D	**40.0**	**F**	N/A	N/A	N/A	N/A

6.7.13 Design Year (2035) Build Intersection LOS and Queuing Analysis

This section documents the intersection LOS and queuing analysis results for the design year (2035) Build Alternative. The highest intersection volumes from each of the five (5) Build Alternatives in both the AM and PM peak hours are utilized to perform the intersection LOS and queuing analysis presented in this section.

6.7.14 Intersection Volumes and LOS Results

The highest intersection peak hour volumes were identified by comparing the peak hour total approach peak hour volumes at each of the fifteen (15) study area intersections presented earlier in the report. The study area intersections were grouped so that volume continuity (i.e., the upstream departure volume at one intersection is equal to the approach volume of the immediate intersection downstream) between intersections was maintained. **Table 44** identifies the study area intersections and the Build Alternative (1 though 5) where the peak hour volumes were selected. As can be seen in the table, the highest peak hour intersection volumes were identified in Alternative 4 and Alternative 5.

Table 44: Design Year (2035) Build Alternative – Highest Peak Hour Intersection Volume

Intersection	Build Alternative	
	AM Peak	PM Peak
Village Way/McFadden Ave.	4	3
Village Way/SR-55 SB Ramps	4	3
Sycamore Ave./Newport Blvd.	2	4
SR-55 SB Ramps/Edinger Ave./Auto Mall Dr.	2	4
SR-55 NB Ramps/Edinger Ave.	2	4
SR-55 SB Off-ramp/Grand Ave.	5	5
Dyer Rd./Grand Ave.	5	5
SR-55 SB Ramps/Dyer Rd./Hotel Terrace Dr.	5	5
SR-55 NB Ramps/Dyer Rd.	5	5
Pullman St./Dyer Rd.	5	5
Hutton Centre Dr./Imperial Prom./MacArthur Blvd.	4	4
SR-55 SB Ramps/MacArthur Blvd.	4	4
SR-55 NB Ramps/MacArthur Blvd.	4	4
Fitch/MacArthur Blvd.	4	4
Red Hill Ave./MacArthur Blvd.	4	4

The design year (2035) Build Alternative intersection turning movement volumes for the AM and PM peak hours are graphically illustrated in the separately bound "Traffic Operations Analysis Report." The peak hour intersection volumes identified in the figure were input into Synchro along with the same intersection geometric configurations identified in Table 22 in the No-Build Alternative section. Additionally, parameters such as PHF (0.92), percent heavy vehicles (2 percent), and lost time were input into the analysis. The LOS results at the study intersections under the design year (2035) Build Alternative are summarized in **Table 45** and the LOS calculation worksheets are contained in the separately bound "Traffic Operations Analysis Report."

Table 45:Design Year (2035) Build Alternative – Peak Hour Intersection LOS

Intersection	Year (2035) No-Build Alternative				Year (2035) Build Alternative			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Village Way/McFadden Ave.	**66.4**	**E**	42.8	D	**159.5**	**F**	51.6	D
Village Way/SR-55 SB Ramps[1]	**58.8**	**F**	15.7	C	**236.6**	**F**	21.1	C
Village Way/SR-55 SB Ramps (signal)	N/A	N/A	N/A	N/A	24.5	C	27.6	C
Sycamore Ave./Newport Blvd.	**208.1**	**F**	**200.7**	**F**	**185.1**	**F**	**169.4**	**F**
SR-55 SB Ramps/Edinger Ave./Auto Mall Dr.	**67.8**	**E**	**159.0**	**F**	**69.0**	**E**	**152.2**	**F**
SR-55 NB Ramps/Edinger Ave.	**74.7**	**E**	**122.1**	**F**	**71.7**	**E**	**126.0**	**F**
SR-55 SB Off-ramp/Grand Ave.	25.5	C	20.6	C	25.8	C	20.2	C
Dyer Rd./Grand Ave.	17.0	B	21.1	C	17.6	B	23.2	C
SR-55 SB Ramps/Dyer Rd./Hotel Terrace Dr.	28.6	C	**69.7**	**E**	29.4	C	**75.5**	**E**
SR-55 NB Ramps/Dyer Rd.	19.2	B	14.2	B	19.3	B	16.6	B
Pullman St./Dyer Rd.	**61.7**	**E**	**67.1**	**E**	**64.9**	**E**	**86.9**	**F**
Hutton Centre Dr./Imperial Prom./MacArthur Blvd.	**189.7**	**F**	**108.0**	**F**	**216.0**	**F**	**121.2**	**F**
SR-55 SB Ramps/MacArthur Blvd.	22.2	C	16.3	B	22.2	C	16.1	B
SR-55 NB Ramps/MacArthur Blvd.	25.3	C	11.3	B	23.8	C	11.4	B
Fitch/MacArthur Blvd.	13.4	B	24.2	C	12.7	B	38.6	D
Red Hill Ave./MacArthur Blvd.	49.2	D	**97.7**	**F**	**66.6**	**E**	**111.5**	**F**

Notes:
1. Stop Controlled Intersection
Shaded cells indicate LOS E or LOS F.
All intersection analyses conducted using Synchro 6.
Delay = Average delay in seconds per vehicle.

Table 45 indicates that the same study area intersections in the design year (2035) Build Alternative and the No-Build Alternative are projected to operate at LOS E or F in one or both peak hours, which are listed below. At the Red Hill Avenue/MacArthur Blvd. intersection, the projected LOS during the AM peak hour degrades from LOS D in the No-Build Alternative to LOS E in the Build Alternative due to the higher forecast volumes at this intersection. Additionally, the delay calculations at several intersections in the Build Alternative slightly increase over those identified in the No-Build Alternative due to the overall higher forecast volumes associated with the proposed freeway improvements in the Alternative 4 and Alternative 5 scenarios.

The following intersections are project to operate at LOS E or F in one or both peak hours:

- Village Way/McFadden Ave. (AM Peak Hour)
- Village Way/SR-55 SB Ramps (AM Peak Hour)
- Sycamore Ave./Newport Blvd. (AM and PM Peak Hour)
- SR-55 SB Ramps/Edinger Ave./Auto Mall Dr. (AM and PM Peak Hour)
- SR-55 NB Ramps/Edinger Ave. (AM and PM Peak Hour)
- SR-55 Ramps/Dyer Rd./Hotel Terrace Dr. (PM Peak Hour)
- Pullman St./Dyer Rd. (AM and PM Peak Hour)
- Hutton Centre Dr./Imperial Prom./MacArthur Blvd. (AM and PM Peak Hour)
- Red Hill Ave./MacArthur Blvd. (AM and PM Peak Hour)

One improvement that can be accommodated is the signalization of the intersection at Village Way and the SR-55 SB Ramps. The Build Alternatives indicated an increase in vehicles turning onto Village Way from McFadden Ave. to enter the SB SR-55 freeway during the AM peak hour. Signalizing this intersection while maintaining the existing geometry improves to LOS C conditions during both the AM and PM peak hours.

6.7.15 Queuing Analysis

This section evaluates projected queuing for the design year (2035) Build Alternative condition at each of the fifteen study area intersections. Table 25 displays design year (2035) predicted maximum queue lengths in feet by approach movement compared to the storage provided in the design year (2035) Build Alternative configuration with the highest intersection volumes shown in the previous figure. Queuing calculation worksheets are contained in Traffic Appendix D (Separately Bounded) within the intersection LOS worksheets.

As shown in queuing analysis **Table 46**, each study area intersection has at least one movement in the peak hour with inadequate storage for the projected demand in the design year (2035) Build Alternative with the proposed geometry. It should be noted that on- and off-ramps at ramp intersections have been modified/widened out to provide additional storage for projected turning movements where feasible within the existing right-of-way. The queuing analysis indicates that vehicle queues will not extend onto the mainline freeway.

Table 46: Design Year (2035) Build Alternative – Queuing Analysis

Intersection/Movement	% Queue	Storage (feet)	Queue Length per lane (feet)		Adequate Storage
			AM Peak	PM Peak	
Village Way/McFadden Ave.					
EB Left Turn	50th	195	59	82	Yes
	95th		#131	141	Yes
WB Left Turn	50th	235	~445	~151	No
	95th		#570	#247	No
NB Left Turn	50th	90	77	122	No
	95th		135	198	No
NB Right Turn	50th	180	N/A	19	Yes
	95th		52	#154	Yes
Village Way/SR-55 SB Ramps[1]					
Sycamore Avenue/Newport Boulevard					
EB Left Turn	50th	370	146	~413	No
	95th		N/A	N/A	Yes
WB Left Turn	50th	700	101	55	Yes
	95th		157	93	Yes
NB Left Turn	50th	75	~644	~1094	No
	95th		#860	#1341	No
SB Left Turn	50th	70	238	166	No
	95th		331	#288	No
Edinger Ave./SR-55 SB Ramps/Auto Mall Drive					
EB Left Turn	50th	170	29	50	Yes
	95th		67	97	Yes
WB Left Turn	50th	190	~492	~582	No
	95th		#589	#561	No
NB Left Turn	50th	1200	~303	~383	Yes
	95th		N/A	N/A	Yes
SB Left Turn	50th	115	53	168	No
	95th		99	#285	No
Grand Ave./SR-55 SB Ramps					
WB Left Turn	50th	200	202	125	No
	95th		N/A	N/A	Yes
Dyer Rd. /Grand Ave.					
EB Left Turn	50th	100	92	183	No
	95th		122	176	No
SB Left Turn	50th	225	324	209	No
	95th		251	264	No
SB Right Turn	50th	225	232	439	No
	95th		239	#231	No
Dyer Rd. /SR-55 SB Ramps/Hotel Terrace Drive					
EB Left Turn	50th	110	49	82	Yes
	95th		97	143	No
EB Right Turn	50th	435	N/A	N/A	Yes
	95th		68	66	Yes
WB Left Turn	50th	250	124	~425	No
	95th		143	#472	No
WB Right Turn	50th	90	9	8	Yes
	95th		14	9	Yes
NB Left Turn	50th	225	208	132	Yes
	95th		N/A	N/A	Yes
SB Right Turn	50th	75	13	47	Yes
	95th		60	108	No

Table 46: Design Year (2035) Build Alternative – Queuing Analysis (cont.)

Dyer Rd. /SR-55 NB Ramps					
EB Right Turn	50th	200	N/A	568	No
	95th		N/A	647	No
NB Left Turn	50th	1100	372	67	Yes
	95th		N/A	N/A	Yes
NB Right Turn	50th	365	342	6	Yes
	95th		N/A	N/A	Yes
Dyer Rd. /Pullman St.					
EB Left Turn	50th	205	271	~102	No
	95th		#354	#222	No
WB Left Turn	50th	190	78	37	Yes
	95th		#191	79	No
NB Left Turn	50th	190	72	363	No
	95th		130	#590	No
NB Right Turn	50th	195	N/A	3	Yes
	95th		29	27	Yes
SB Left Turn	50th	80	11	22	Yes
	95th		32	53	Yes
SB Right Turn	50th	80	N/A	96	No
	95th		44	186	No
MacArthur Blvd./Hutton Centre Drive/Imperial Promenade					
EB Left Turn	50th	150	62	28	Yes
	95th		#127	53	Yes
EB Right Turn	50th	180	42	5	Yes
	95th		92	24	Yes
WB Left Turn	50th	205	~392	51	Yes
	95th		#486	#88	No
WB Right Turn	50th	300	18	15	Yes
	95th		114	66	Yes
NB Left Turn	50th	175	16	73	Yes
	95th		42	127	Yes
NB Right Turn	50th	175	N/A	188	No
	95th		31	293	No
SB Left Turn	50th	300	65	198	Yes
	95th		97	258	Yes
SB Right Turn	50th	300	N/A	N/A	Yes
	95th		21	34	Yes
MacArthur Blvd./SR-55 SB Off-Ramp					
EB Right Turn	50th	375	310	319	Yes
	95th		89	271	Yes
SB Left Turn	50th	1300	384	127	Yes
	95th		N/A	N/A	Yes
SB Right Turn	50th	440	392	323	Yes
	95th		N/A	N/A	Yes
MacArthur Blvd./SR-55 NB Off-Ramp					
NB Left Turn	50th	1100	447	286	Yes
	95th		N/A	N/A	Yes
MacArthur Blvd./Fitch					
WB Left Turn	50th	155	129	18	Yes
	95th		152	18	Yes
NB Left Turn	50th	135	49	~324	No
	95th		80	#447	No
NB Right Turn	50th	135	N/A	39	Yes
	95th		40	107	Yes

Table 46: Design Year (2035) Build Alternative – Queuing Analysis (cont.)

MacArthur Blvd./Red Hill Avenue					
EB Left Turn	50th	790	195	252	Yes
	95th		198	#370	Yes
EB Right Turn	50th	375	33	25	Yes
	95th		32	69	Yes
WB Left Turn	50th	225	67	67	Yes
	95th		119	117	Yes
NB Left Turn	50th	210	70	~545	No
	95th		#180	#750	No
SB Left Turn	50th	335	~208	119	Yes
	95th		#311	#206	Yes

Notes:
1. Stop controlled intersection. Queuing analysis not available.
Shaded cells indicate insufficient storage.
All intersection analyses conducted using Synchro 6.
N/A = Not Applicable
~ = Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.
# = 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

The eleven on-ramps along SR-55 between I-5 and MacArthur Blvd. were also analyzed for future ramp metering in the design year (2035) Build Alternative, which are contained in Traffic Appendix D (Separately Bounded) with the intersection and queuing analysis worksheets. Similar to the intersection analysis, the highest on-ramp volumes were selected from the five Build Alternatives in the AM and PM peak hours and utilized in the analysis. Each ramp metering analysis spreadsheet shows the arrival and departure rate along with a graphical representation of the accumulate queues. Additionally, the ramp lanes, an average vehicle length, and the ramp storage length are input for each ramp. As identified in the 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 less than the available storage provided per lane that will prevent queues extending beyond the ramp termini onto the local intersections. **Table 47** presents the ramp metering queuing analysis for each of the on-ramps within the corridor.

Table 47:
Design Year (2035) Build Alternative – Ramp Meter Queuing Analysis

On-Ramp	Peak Hour	Lanes/ Storage (ft)	Volume (Alt.)	Minimum Meter Rate	Maximum Queue Ft/Lane	Adequate Storage
NB McFadden Ave.	AM	2/396	1355 (1)	665	375	Yes
	PM	2/410	1570 (5)	775	300	Yes
SB McFadden Ave.	AM	2/350	1365 (4)	675	225	Yes
	PM	2/350	555 (3)	270	225	Yes
NB Edinger Ave.	AM	2/513	750 (5)	360	450	Yes
	PM	2/513	1010 (1)	490	450	Yes
SB Edinger Ave.	AM	2/960	715 (3)	330	825	Yes
	PM	2/960	825 (3)	385	825	Yes
NB Dyer Rd. EB	AM	1/790	625 (4)	600	750	Yes
	PM	1/810	1085 (5)	> 900	> 810	**No**
NB Dyer Rd. WB	AM	2/203	395 (4)	240	N/A	Yes
	PM	2/203	1510 (5)	750	150	Yes

Table 47:
Design Year (2035) Build Alternative – Ramp Meter Queuing Analysis (cont.)

On-Ramp	Peak Hour	Lanes/ Storage (ft)	Volume (Alt.)	Minimum Meter Rate	Maximum Queue Ft/Lane	Adequate Storage
SB Dyer Rd.	AM	2/744	920 (3)	440	600	Yes
	PM	2/744	1480 (5)	720	600	Yes
NB MacArthur Blvd. EB	AM	2/640	700 (5)	330	600	Yes
	PM	2/640	795 (4)	380	525	Yes
NB MacArthur Blvd. WB	AM	1/670	350 (5)	330	600	Yes
	PM	1/670	1185 (2)	> 900	> 670	**No**
SB MacArthur Blvd. EB	AM	2/590	840 (4)	405	450	Yes
	PM	2/590	1125 (4)	545	525	Yes
SB MacArthur Blvd. WB	AM	1/770	190 (3)	240	N/A	Yes
	PM	1/770	730 (4)	705	750	Yes

Notes:
Shaded cells indicate insufficient storage.
Suggested meter rates between 240 vph/lane and 900 vph/lane.
N/A = Not Applicable.

6.7.16 Additional Traffic Conclusions

Alternative 1: The NB SR-55/WB Dyer Rd. on-ramp volume exceeds 1,500 pcph with a single lane ramp. This ramp was also analyzed to provide a two-lane ramp with a 1,000 foot auxiliary lane, but the LOS designation remains at LOS F in both peak hours due to the mainline facility exceeding capacity. However, the projected density improves with the 2-lane configuration. This is a similar case at the SB SR-55/Dyer Rd. off-ramp.

Alternative 2: Several on- and off-ramp locations along SR-55 are projected to operate with improved densities compared to the No-Build Alternative although the LOS designation remains at LOS E or F. Similar to Build Alternative 1, the projected hourly ramp volumes at several locations exceed 1,500 pcph where a two-lane ramp should be provided. The following ramps were analyzed with the two-lane configuration and associated auxiliary lane. Ramps with projected volumes that are close to the threshold were also analyzed. The LOS designation during the AM/PM peak hours are also provided for comparison purposes.

- NB SR-55/Dyer Rd. off-ramp: LOS A/A with 2-lane exit and 1,300’ auxiliary lane
- NB SR-55/WB Dyer Rd. on-ramp: LOS A/F with 2-lane entrance and 1,000’ auxiliary lane
- SB SR-55/MacArthur Blvd. off-ramp: LOS A/A with 2-lane exit and 1,300’ auxiliary lane

Alternative 3:

- NB SR-55/WB Dyer Rd. on-ramp: LOS A/F with 2-lane entrance and 1,000’ auxiliary lane
- SB SR-55/Dyer Rd. off-ramp: LOS A/A with 2-lane exit and 1,300’ auxiliary lane

Alternative 4: Similar to Alternative 1, the projected hourly ramp volumes at several locations exceed 1,500 pcph where a two-lane ramp should be provided. The following ramps were analyzed with the two-

lane configuration and associated auxiliary lane. Ramps with projected volumes that are close to the threshold were also analyzed.

- NB SR-55/WB Dyer Rd. on-ramp: LOS A/F with 2-lane entrance and 1,000' auxiliary lane
- SB SR-55/Dyer Rd. off-ramp: LOS A/A with 2-lane exit and 1,300' auxiliary lane

Alternative 5:

- NB SR-55/WB Dyer Rd. on-ramp: LOS F/F with 2-lane entrance and 1,000' auxiliary lane
- SB SR-55/Dyer Rd. off-ramp: LOS F/A with 2-lane exit and 1,300' auxiliary lane

6.8 NON STANDARD DESIGN FEATURES

Alternative 1- "Auxiliary Lane Widening" will have the following advisory non-standard features:

- Standard 504.3 (6) (HDM) An auxiliary lane approximately 1,300 ft should be provided in advance of a 2-lane exit.

  - Auxiliary lane from SB McFadden Ave. on-ramp to SB Edinger Ave. 2-lane off-ramp is 1,119 ft. This segment has LOS F for both existing (2007) and design year (2035), and therefore, the auxiliary lane is crucial.

- Standard 504.3(9) (HDM) The distance between successive on-ramps should be about 1,000 ft.

  - The distance between SB MacArthur Blvd. successive on-ramps is 694 ft.

  - The distance between NB MacArthur Blvd. successive on-ramps is 834 ft.

  - The distance between NB Dyer Rd. successive on-ramps is 772 ft.

- Standard 504.4 (6) (HDM) At a branch merge, a 2,500-foot length of auxiliary lane should be provided beyond the merge of one-lane of the inlet.

  - Auxiliary lane from SB I-405 branch connector to SB MacArthur Blvd. on-ramp is 2228 ft.
  - Auxiliary lane from NB I-405 branch connector to NB MacArthur Blvd. off-ramp is 2010 ft.

Alternative 1- "Auxiliary Lane Widening" will have the following mandatory non-standard features:

- Standard 504.2(2) (HDM) Radius (less than 300ft) shall have minimum deceleration length (DL) of 570 ft.

  - NB MacArthur Blvd. off-ramp "MA-6" has a radius of 300 ft. and a deceleration length of 407 ft.

Alternative 2- "GP Lane Widening" will have the following advisory non-standard features:

- Standard 504.3 (6) (HDM) An auxiliary lane approximately 1,300 ft should be provided in advance of a 2-lane exit.

  - Auxiliary lane from SB McFadden Ave. on-ramp to SB Edinger Ave. 2-lane off-ramp is 1,119 ft. This segment has LOS F for both existing (2007) and design year (2035), and therefore, the auxiliary lane is crucial.

- Standard 504.7 (HDM) The weaving length measured between interchanges should not be less than 1,600 ft.

  - Weaving length from NB McFadden Ave. on-ramp to NB I-5 off-ramp is 1,421 ft.

- Standard 504.4 (6) (HDM) At a branch merge, a 2,500-foot length of auxiliary lane should be provided beyond the merge of one-lane of the inlet.

  - Auxiliary lane from SB I-405 branch connector to SB MacArthur Blvd. on-ramp is 2000 ft.
  - Auxiliary lane from NB I-405 branch connector to NB MacArthur Blvd. off-ramp is 2092 ft.

- Standard 504.2 (HDM) The on-ramp lane drop taper past zero point should not be less than 600 ft (50:1).

  - NB McFadden Ave. on-ramp has a lane drop taper of 435 ft (36:1) due to the existing structure and sound wall to be protected in place.

- Standard 504.3(9) (HDM) The distance between successive on-ramps should be about 1,000 ft.

  - The distance between SB MacArthur Blvd. successive on-ramps is 600 ft.

  - The distance between NB MacArthur Blvd. successive on-ramps is 829 ft.

  - The distance between NB Dyer Rd. successive on-ramps is 773 ft.

  - The distance between NB I-405 successive on-ramps is 850 ft.

Alternative 2- "GP Lane Widening" will have the following mandatory non-standard features:

- Standard 504.2(2) (HDM) Radius (300 ft – 499 ft) shall have minimum deceleration length (DL) of 570 ft.

  - NB MacArthur Blvd. off-ramp "MA-6" has a radius of 300 ft. and a deceleration length of 329 ft.

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

  - Shoulder width between SB MacArthur Blvd. on-ramp and SB I-405 off-ramp (STA 343+18.75 to STA 348+37.72) has an outside (right) shoulder width varying from 4 ft. to 10 ft. due to existing bents to be protected in place.

-Shoulder width between NB McFadden Ave. on-ramp and NB I-5 off-ramp (STA 520+20.32 to STA 526+25.59) has an outside (right) shoulder width varying from 8 ft. to 10 ft. due to the existing structure and sound wall to be protected in place.

- Standard 301.1 (HDM) The basic lane width for new construction on two-lane and multilane highways, ramps, collector roads, and other appurtenant roadways shall be 12 feet.

  -The lane width between the NB McFadden Ave. on-ramp and NB I-5 off-ramp (STA 512+46.28 to STA 529+23.68) has lane width varying from 11 ft. to 12 ft. due to the existing structure and sound wall to be protected in place.

Alternative 3- "Auxiliary and GP Lane Widening" will have the following advisory non-standard features:

- Standard 504.3 (6) (HDM) An auxiliary lane approximately 1,300 ft should be provided in advance of a 2-lane exit.

  - Auxiliary lane from SB McFadden Ave. on-ramp to SB Edinger Ave. 2-lane off-ramp is 1,119 ft. This segment has LOS F for both existing (2007) and design year (2035), and therefore, the auxiliary lane is crucial.

- Standard 504.7 (HDM) The weaving length measured between interchanges should not be less than 1,600 ft.

  - Weaving length from NB McFadden Ave. on-ramp to NB I-5 off-ramp is 1,421 ft.

- Standard 504.4 (6) (HDM) At a branch merge, a 2,500-foot length of auxiliary lane should be provided beyond the merge of one-lane of the inlet.

  - Auxiliary lane from SB I-405 branch connector to SB MacArthur Blvd. on-ramp is 2000 ft.
  - Auxiliary lane from NB I-405 branch connector to NB MacArthur Blvd. off-ramp is 2092 ft.

- Standard 504.2 (HDM) The on-ramp lane drop taper past zero point should not be less than 600 ft (50:1).

  - NB McFadden Ave. on-ramp has a lane drop taper of 435 ft (36:1) due to the existing structure and sound wall to be protected in place.

- Standard 504.3(9) (HDM) The distance between successive on-ramps should be about 1,000 ft.

  - The distance between SB MacArthur Blvd. successive on-ramps is 600 ft.

  - The distance between NB MacArthur Blvd. successive on-ramps is 829 ft.

  - The distance between NB Dyer Rd. successive on-ramps is 773 ft.

  - The distance between NB I-405 successive on-ramps is 850 ft.

Alternative 3- "Auxiliary and GP Lane Widening" will have the following mandatory non-standard features:

- Standard 504.2(2) (HDM) Radius (300 ft – 499 ft) shall have minimum deceleration length (DL) of 570 ft.

  - NB MacArthur Blvd. off-ramp "MA-6" has a radius of 300 ft. and a deceleration length of 329 ft.

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

  - Shoulder width between SB MacArthur Blvd. on-ramp and SB I-405 off-ramp (STA 343+18.75 to STA 348+37.72) has an outside (right) shoulder width varying from 4 ft. to 10 ft. due to existing bents to be protected in place.

  -Shoulder width between NB McFadden Ave. on-ramp and NB I-5 off-ramp (STA 520+20.32 to STA 526+25.59) has an outside (right) shoulder width varying from 8 ft. to 10 ft. due to an existing structure and sound wall to be protected in place.

- Standard 301.1 (HDM) The basic lane width for new construction on two-lane and multilane highways, ramps, collector roads, and other appurtenant roadways shall be 12 feet.

  -The lane width between the NB McFadden Ave. on-ramp and NB I-5 off-ramp (STA 512+46.28 to STA 529+23.68) has lane width varying from 11 ft. to 12 ft. due to the existing structure and sound wall to be protected in place.

Alternative 5- "Auxiliary, GP, and HOV Lane Widening" will have the following advisory non-standard features:

- Standard 504.3 (6) (HDM) An auxiliary lane approximately 1,300 ft should be provided in advance of a 2-lane exit.

  - Auxiliary lane from SB McFadden Ave. on-ramp to SB Edinger Ave. 2-lane off-ramp is 1,142 ft. This segment has LOS F for both existing (2007) and design year (2035), and therefore, the auxiliary lane is crucial.

- Standard 504.3(9) (HDM) The distance between successive on-ramps should be about 1,000 ft.

  - The distance between SB MacArthur Blvd. successive on-ramps is 694 ft.

  - The distance between NB MacArthur Blvd. successive on-ramps is 834 ft.

  - The distance between NB Dyer Rd. successive on-ramps is 772 ft.

- Standard 504.4 (6) (HDM) At a branch merge, a 2,500-foot length of auxiliary lane should be provided beyond the merge of one-lane of the inlet.

  - Auxiliary lane from SB I-405 branch connector to SB MacArthur Blvd. on-ramp is 2228 ft.

- Auxiliary lane from NB I-405 branch connector to NB MacArthur Blvd. off-ramp is 2010 ft.

Alternative 5- "Auxiliary, GP, and HOV Lane Widening" will have the following <u>mandatory</u> non-standard features:

- <u>Standard 504.2(2) (HDM) Radius (less than 300ft) shall have minimum deceleration length (DL) of 570 ft.</u>

  - NB MacArthur Blvd. off-ramp "MA-6" has a radius of 300 ft. and a deceleration length of 407 ft.

- <u>Standard 302.1 (HDM) The shoulder widths given in Table 302.1 shall be the minimum continuous usable width of pave shoulder.</u>

  -Shoulder width between the NB McFadden Ave. on-ramp and NB I-5 off-ramp (STA 520+86.87 to STA 526+25.59) has an outside (right) shoulder width varying from 8 ft. to 10 ft. due to the existing structure and sound wall to be protected in place.

- <u>Standard 301.1 (HDM) The basic lane width for new construction on two-lane and multilane highways, ramps, collector roads, and other appurtenant roadways shall be 12 feet.</u>

  -The lane width between the NB McFadden Ave. on-ramp and NB I-5 off-ramp (STA 519+31.51 to STA 529+23.68) has lane width varying from 11 ft. to 12 ft. due to the existing structure and sound wall to be protected in place.

6.9 RIGHT-OF-WAY

Alternatives 1 and 2 would require some partial right-of-way acquisition due to one lane widening. Alternatives 3 and 5 would require additional right-of-way due to two lane widening. Alternative 4 was rejected from further alternative analysis because it would not meet the project goals and objective due to major impact to the existing building structure within the project limit. Alternative 4 would require the full acquisition of ten buildings.

The proposed right-of-way for each alternative is listed below and separately bound right-of-way plans are provided with this report.

Alternative 1: right-of-way: 139,027 SF, TCE: 22,826 SF, (10) parcels, (2) buildings impact
Alternative 2: right-of-way: 182,666 SF, TCE: 44,745 SF, (16) parcels, (2) buildings impact
Alternative 3: right-of-way: 360,148 SF TCE: 63,044 SF, (29) parcels, (4-6) buildings impact
Alternative 4: right-of-way: 565,502 SF, TCE: 68,793 SF, (35) parcels, (10) buildings impact
Alternative 5: right-of-way: 231,020 SF, TCE: 43,604 SF, (15) parcels, (4-6) buildings impact

As an option, to eliminate the right-of-way acquisition, the SR-55 mainline and ramp lane width and shoulders could be reduced from standard design by reducing the left shoulder from 10' to 2' (8' extra width) and by reducing the GP lanes from 12' to 11' to provide the additional 12' (four feet from four GP lanes) required for the third lane widening. This alternative was developed, but was eliminated from further study per Caltrans.

Temporary Construction Easements (TCE) of 5' are assumed for the construction of several retaining walls footing easement along the proposed right-of-way, as listed below in Table 48. (Not all retaining walls require TCE since they are within existing right-of-way.)

Table 48: TCE of Retaining Wall Footing Easement

Alternative 1 and 5

Retaining walls	NB		SB		Length (ft)	No. Of Parcels Affected	Temporary Construction Easement Area (ft^2)
	Begin Sta.	End Sta.	Begin Sta.	End Sta.			
DY-6	2+60	5+53			293	0	1465
CL-55*			414+82	423+23	841*	0*	0*
CL-55, MF-1			504+19	514+85	1066	2	5330
CL-55*	503+26	512+00			874*	0*	0*
				Total	1359	2	6795

Alternative 2 and 3

Retaining walls	NB		SB		Length (ft)	No. Of Parcels Affected	Temporary Construction Easement Area (ft^2)
	Begin Sta.	End Sta.	Begin Sta.	End Sta.			
CL-55, MA-6	339+79	363+38			2359	6	11795
CL-55, MA-1			343+19	364+63	2144	0	10720
DY-6	2+60	5+53			293	0	1465
CL-55*			414+82	423+23	841*	0*	0*
CL-55, MF-1			504+19	514+85	1066	2	5330
CL-55*	503+26	512+00			874*	0*	0*
				Total	5862	8	29310

*Proposed retaining walls are within the existing right-of-way. However, additional TCE may be required in future.

6.10 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 in order 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 PS&E stage. 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 same number of mainline lanes will be maintained during construction. There will be some lane closures due to temporary traffic striping at night for construction of overhead signs. The cost of traffic management is included in the cost estimate.

6.11 STAGE CONSTRUCTION AND TEMPORARY DETOURS

The project proposes to be constructed by temporary striping of the mainline freeway in order 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’ lanes to provide for four 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.

6.12 STRUCTURES

6.12.1 MacArthur Blvd. UC Widen

The original MacArthur Blvd. UC is as four-span, cast-in-place, box girder bridge. Originally constructed in the 1950's, the bridge was widened on both sides with a cast-in-place prestressed concrete slab in 2002. Both the original and the new bridge structures are supported by diaphragm abutments with 45-ton concrete piles.

This study recommends widening the MacArthur Blvd. UC on both sides. The new widening will consist of precast/prestressed concrete box beams with a cast-in-place concrete topping to provide a uniform driving surface, match the existing bridge structural response characteristics, and meet the performance criteria specified by Caltrans.

Alternatives 1 and 5 do not require MacArthur Blvd. UC bridge widening. However, Alternatives 2, 3, and 4 require identical widening, see EXHIBIT K.

a) Seismic Retrofit:

The MacArthur Blvd. UC must satisfy Caltrans' rigorous seismic design and retrofitting criteria specified in the latest version of the Seismic Design Criteria and Memos to Designers Section 20-4. Seismic deficiencies on this structure will be investigated in more detail based on the latest edition of these documents during the Type-Selection phase.

Based on a preliminary seismic assessment of the existing bridge, retrofit is not required. Integral abutments, continuous spans, multiple column bents, and no significant liquefaction potential are strong indicators that the existing structure is safe for future seismic events.

b) Vertical Clearance:

As mentioned previously, precast/prestressed concrete box beams will be used for the widening on both sides of the bridge to allow construction to proceed without interruption and without traffic detours. Based on Structure Maintenance and Investigations (OSMI) report data and as-built information, the minimum vertical clearance will be 15.1 ft. This vertical clearance is sufficient according to Topic 309.2 "Vertical Clearance" in the HDM which specifies a non-freeway minimum vertical clearance requirement of 15.0 ft over the ultimate traveled way.

Since precast bridge girders will be used, no falsework is required to construct this bridge widening. Therefore, the temporary minimum vertical clearance is the same as the final vertical clearance.

6.12.2 Dyer Rd. UC Widen

The original Dyer Rd. UC is as four-span, cast-in-place, box girder bridge. Originally constructed in the 1950's, the bridge was widened on both sides with a cast-in-place box girder structure in the 1980's. Both the original and the new bridge structures are supported by diaphragm abutments with 45-ton concrete piles.

This study recommends widening the Dyer Rd. UC on both sides. The new widening will consist of precast/prestressed concrete box beams with a cast-in-place concrete topping to provide a uniform driving surface, match the existing bridge structural response characteristics, and meet the performance criteria specified by Caltrans.

All build alternatives specified in this report require Dyer Rd UC bridge widening, see Exhibit K.

a) Seismic Retrofit:

The Dyer Rd. UC must satisfy Caltrans' rigorous seismic design and retrofitting criteria specified in the latest version of the Seismic Design Criteria and Memos to Designers, Section 20-4. Seismic deficiencies on this structure will be investigated in more detail based on the latest edition of these documents when this project progresses to the Type-Selection phase.

Based on a preliminary seismic assessment of the existing bridge, retrofit is not required. Integral abutments, continuous spans, multiple column bents, and no significant liquefaction potential are strong indicators that the existing structure is safe for future seismic events.

b) Vertical Clearance:

As mentioned previously, precast/prestressed concrete box beams will be used for the widening on both sides of the bridge, to allow construction to proceed without interruption and without traffic detours. Based on OSMI report data and as-built information, the minimum vertical clearance will be 15.2 ft. This vertical clearance is sufficient according to Topic 309.2 "Vertical Clearance" in the HDM which specifies a non-freeway minimum vertical clearance requirement of 15.0 ft. over the ultimate traveled way.

Since precast bridge girders will be used, no falsework is required to construct this bridge widening. Therefore, the temporary minimum vertical clearance is the same as the final vertical clearance.

6.12.3 Edinger Ave. UC Widen

The original Edinger Ave. UC is as four span, cast-in-place, box girder bridge. Originally constructed in the 1950's, the bridge was widened on both sides with a cast-in-place box girder structure in the 1980's. Both the original and the new bridge structures are supported by diaphragm abutments with 45-ton concrete piles.

This study recommends widening the Dyer Rd. UC on both sides. The new widening will consist of a cast-in-place concrete box girder bridge to match the existing bridge. This bridge type meets structural response characteristics and the performance criteria specified by Caltrans.

All build alternatives specified in this report require Edinger Ave. UC bridge widening, see Exhibit K.

a) Seismic Retrofit:

The Edinger Ave. UC must satisfy Caltrans' rigorous seismic design and retrofitting criteria specified in the latest version of the Seismic Design Criteria and Memos to Designers Section 20-4. Seismic deficiencies on this structure will be investigated in more detail based on the latest edition of these documents when this project progresses to the Type-Selection phase.

Based on a preliminary seismic assessment of the existing bridge, retrofit is not required. Integral abutments, continuous spans, multiple column bents, and no significant liquefaction potential are strong indicators that the existing structure is safe for future seismic events.

b) Vertical Clearance:
As mentioned previously, precast/prestressed concrete box beams will be used for the widenings on both sides of the bridge to allow construction to proceed without interruption and without traffic detours. Based on OSMI report data and as-built information, the minimum vertical clearance will be 22.3 ft. This vertical clearance is sufficient according to Topic 309.2 “Vertical Clearance” in the HDM which specifies a non-freeway minimum vertical clearance requirement of 15.0 ft. over the ultimate traveled way.

The temporary minimum vertical clearance that is reduced for falsework is 20.3 ft., which exceeds the allowable temporary vertical falsework clearance of 15.0 ft.

6.12.4 South Tustin Overhead - Widen

The original South Tustin Overhead (OH) is as three span, cast-in-place, box girder bridge. Originally constructed in the 1950’s, the bridge was widened on both sides with a cast-in-place box girder structure in the 1980’s. Both the original and the new bridge structures are supported by diaphragm abutments with 45 ton concrete piles.

This study recommends widening the South Tustin OH on both sides. The new widening will consist of precast/prestressed concrete box beams with a cast-in-place concrete topping to provide a uniform driving surface, match the existing bridge structural response characteristics, and meet the performance criteria specified by Caltrans.

All build alternatives specified in this report require Tustin OH widening, see Exhibit K.

a) Seismic Retrofit:
The South Tustin OH must satisfy Caltrans’ rigorous seismic design and retrofitting criteria specified in the latest version of the Seismic Design Criteria and Memos to Designers Section 20-4. Seismic deficiencies on this structure will be investigated based on this latest Caltrans SDC during the Type-Selection (35% PS&E) phase of this project.

Based on a preliminary seismic assessment of the existing bridge, retrofit is not required. Integral abutments, continuous spans, multiple column bents, and no significant liquefaction potential are strong indicators that the existing structure is safe for future seismic events.

b) Vertical Clearance:
As mentioned previously, precast/prestressed concrete box beams will be used for the widenings on both sides of the bridge, to allow construction to proceed without interruption and without traffic detours. Based on OSMI report data and as-built information, the minimum vertical clearance will be 22.7 ft. This vertical clearance is less than the amount recommended in Topic 309.2 “Vertical Clearance” in the HDM which specifies a minimum vertical clearance requirement of 23.0 ft. over the tracks. It should be noted that the minimum vertical clearance is under the existing bridge, and not under the widening. Therefore, the widening will not reduce the vertical clearance.

Since precast bridge girders will be used, no falsework is required to construct this bridge widening. Therefore, the temporary minimum vertical clearance is the same as the final vertical clearance.

6.12.5 Warner Avenue OC

The original Warner Ave. OC is as two-span, cast-in-place box girder bridge that was originally constructed in the 1980's. This bridge is supported by open-end seat abutments with 45-ton concrete piles.

This study recommends placing tieback walls at the toe-of-slope for Alternatives 1, 2, 3, and 5, and bridge replacement for Alternative 4. The tieback walls will allow for the widening of SR-55 and maintain adequate clearance between the new wall and the abutment foundation. However, there is insufficient clearance between the outside edge-of-shoulder and the face of the abutment for Alternative 4. For this alternative, we recommend replacement with a new cast-in-place concrete box girder bridge. This type of structure meets the performance criteria specified by Caltrans, and matches the architectural theme of the corridor.

a) Seismic Retrofit:

The Warner Avenue OC must satisfy Caltrans' rigorous seismic design and retrofitting criteria specified in the latest version of the Seismic Design Criteria and Memos to Designers, Section 20-4. Seismic deficiencies on this structure will be investigated in more detail based on the latest edition of these documents when this project progresses to the Type-Selection phase.

Based on a preliminary seismic assessment of the existing bridge, retrofit is not required. Relatively recent year-of-construction, continuous spans, multiple column bents, and no significant liquefaction potential are strong indicators that the existing structure is safe for future seismic events.

b) Vertical Clearance:

As mentioned previously, precast/prestressed concrete box beams will be used for the widenings on both sides of the bridge, to allow construction to proceed without interruption and without traffic detours. The minimum vertical clearance of the replacement in Alternative 4 will be 18.4 ft. This vertical clearance is sufficient according to Topic 309.2 "Vertical Clearance" in the California HDM that specifies a freeway minimum vertical clearance requirement of 16.5 ft. over the ultimate traveled way.

Since a cast-in-place bridge is specified for Alternative 4, falsework is required to construct this bridge replacement. Therefore, the temporary minimum vertical clearance is the same as the final vertical clearance.

The temporary minimum vertical clearance that is reduced for falsework is 15.0 ft., which is the allowable temporary vertical falsework clearance of 15.0 ft.

6.13 DRAINAGE

The existing general drainage pattern within this project limit is from northeast to southwest toward Newport Bay, carried via culverts and drainage systems along both sides of the freeway. 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 would not encroach the mainlines.

Major existing drainage structures in the area include:

- A 31.5 ft. wide Orange County Flood Control District (OCFCD) open trapezoidal concrete channel (a.k.a. Lane Channel) is located just west of SR-55 between MacArthur Blvd. and Dyer

Rd., crosses the freeway just north of MacArthur Blvd. in a buried culvert, and parallels the north side of MacArthur Blvd. in an open channel;

- An 8 ft. x 4 ft. reinforced concrete box (RCB) parallels the SB SR-55 between Dyer Rd. and Edinger Ave., and passes below Abutment 1 of Warner Avenue OC; and
- Santa Ana Santa Fe Channel conveys drainage southeasterly along the northeast side of the SCRRA railroad and crosses underneath the SR-55 alignment between Bent 3 and Abutment 4 of the South Tustin Overhead in an 8 ft. x 8 ft. RCB.

Drainage within the project limits that may require relocation are listed below in Table 49. All existing box culverts and RCB will be extended due to the freeway widening. However, existing "Lane Channel" will be relocated and jacked as proposed per PR-ED (EA 005500), Alton Ave. OC and HOV drop ramp by others.

Table 49: Drainage Relocation

From Station	To Station	DESCRIPTION (Existing Drainage System)
336+00.00		CONC V-DITCH
336+60.00		30" RCP
336+90.0		50" RCP
344+10.0		CONC CHANNEL
344+10.0		5'1' RCB
344+20.00		24" RCP
344+20.00		18" RCP
366+90.00	342+80.00	32"x9" RCB
339+00.00	349+50.00	54" RCP
344+10.00	356+00.00	24" RCP
349+50.00		48" RCP
345+00	366+00.00	CONC TRAP CHANNEL 60"x48"
349+50.00	355+10.00	42" RCP
358+30.00		24" RCP
356+00.00	361+30.00	30" RCP
365+70.00	366+30.00	18" RCP
368+00.00		90" RCP
367+40.00	368+50.00	24" RCP
367+80.00	369+00.00	30"x18" RCP
362+500.00		24" RCP
361+00.00	362+00.00	CHANNEL
366+50.00		18" RCP
368+20.00		9" RCP
371+00.00		DBL 120" x 96"

From Station	To Station	DESCRIPTION (Existing Drainage System)
376+00.00	403+00.00	LANE CHANNEL
401+50.00	402+10.00	24" RCP
405+50.00		24" RCP
407+70.00	409+00.00	96"x72" RCB
409+00.00	412+50.00	120"x72" RCB
413+70.00	417+00.00	168"x96" RCB
417+00.00	419+80.00	120"x96" RCB
419+80.00	446+10.00	66" APC
411+40.00	412+40.00	24" RCP
415+40.00	417+50.00	24" RCP
446+10.00	456+00.00	96"x48" RCB
456+00.00	463+20.00	63" APC
463+20.00	475+00.00	60" APC
475+00.00	482+00.00	54" APC
482+00.00	487+70.00	42" APC
487+70.00	493+00.00	CONC CHANNEL
495+10.00		24" RCP
499+50.00	515+70.00	54" APC
503+00.00	504+10.00	96"x96" RCB
503+00.00	514+60.00	120"x48" RCB
515+70.00	526+00.00	42" APC
514+90.00	533+00.00	96"x48" RCB
522+60.00	524+00.00	CONC CHANNEL
526+00.00	528+50.00	36" APC
528+50.00	533+00.00	24" APC

The Alton Ave. OC and HOV drop ramps project drainage construction is not part of this project per Caltrans' and OCTA's agreement.

6.14 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 "General Utility Plan". The existing Southern California Edison transmission overhead power line and existing underground electrical 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 would be notified:

- Southern California Edison Company
- Southern California Gas Company
- Pacific Bell
- Adelphia
- Santa Ana Water
- Orange County Sanitation District
- City of Santa Ana
- Irvine Ranch Water District
- Mobile Oil
- Nextlink

Table 51: The following table only lists utility impacts that will occur in newly acquired ROW. Utilities impacted in previously owned Caltrans ROW are not shown. All stationing based upon SR-55 mainline stations. See EXHIBIT J for Utility Plans.

Table 50: Utilities Impacts with Right of Way Acquisition

Sheet Number	Station	Description	Impact
U-1	NO IMPACTS		
U-2	336+00 to 344+00 (NB)	Electrical lines running along SR-55	Relocate
U-3	345+40 to 357+45 (NB)	Telephone lines running parallel to Cowan Street and crossing Cowan Street intermittently	Pothole Required
	345+40 to 357+45 (NB)	Gas line (4") running parallel to Cowan Street and crossing Cowan Street intermittently	Pothole Required
	346+10 to 354+65 (NB)	Sewer line (8") running parallel to Cowan Street and crossing Cowan Street intermittently	Pothole Required
	346+55 to 357+20 (NB)	City of Irvine water line (10") running parallel to Cowan Street and crossing Cowan Street intermittently	Pothole Required
U-4	NO IMPACTS		
U-5	NO IMPACTS		
U-6	378+55 (SB)	0.6' RCP running perpendicular to SR-55 SB	Pothole Required
U-7	384+90 to 393+00 (NB)	Water line running parallel to Pullman St.	Pothole Required
	385+10 to 393+00 (NB)	Sewer line running parallel to Pullman St.	Pothole Required
	391+10 (NB)	Fire Hydrant	Relocate
U-8	NO IMPACTS		
U-9	399+70 (NB)	Electric Box	Relocate
	402+20 to 404+90 (NB)	Santa Ana Water line (8") running parallel to Pullman St.	Pothole Required
	402+60 (NB)	Power Pole located next to Pullman St.	Relocate
	403+00 (NB)	Fire Hydrant located next to Pullman St.	Relocate
	403+00 (NB)	Edison Box located next to Pullman St.	Relocate
U-10	423+20	36" Gas line running perpendicular to SR-55	Protect in Place
	413+00 (SB)	Above ground gasoline reclaim tank	Relocate
U-11	NO IMPACTS		

Table 50 CONT.

Sheet Number	Station	Description	Impact
U-12	427+00 to 440+90 (NB)	12" ACP - City of Santa Ana	Pothole Required
	427+90 (NB)	Power Pole located next to Pullman St.	Relocate
	427+95 (NB)	Light Post located next to Pullman St.	Relocate
	428+85 (NB)	Edison Manhole	Relocate
	431+20 (NB)	Control Boxes	Protect in Place
	431+35 (NB)	Water Meter next to Pullman St.	Relocate
	432+00 (NB)	Bell System Manhole next to Pullman St.	Relocate
	432+20 (NB)	Street Lighting	Relocate
	433+00 (NB)	Power Pole	Relocate
	434+10 (NB)	Water Meter next to Pullman St.	Relocate
	434+75 (NB)	Power Pole	Relocate
	436+30 (NB)	Power Pole	Relocate
	436+30 to 442+20 (NB)	10" VCP running along Pullman St.	Pothole Required
	436+90 (NB)	Bell System Manhole next to Pullman St.	Relocate
	437+40 (SB)	Power Pole	Relocate
U-13	439+30 (NB)	Water Meter next to Pullman St.	Relocate
	439+40 (NB)	Power Pole	Relocate
	441+30 (SB)	Sewer Manhole	Protect in Place
	441+40 (NB)	Power Pole	Relocate
	442+80 (NB)	Pacific Bell Box	Relocate
	445+20 (NB)	Power Pole	Relocate
	450+00 (NB)	Power Pole	Relocate
	451+80 (NB)	Power Pole	Relocate
U-14	452+50 to 466+50 (SB)	8" ACP running parallel to Ritchey St.	Relocate
	453+20 (SB)	Guy Pole	Protect in Place
	453+60 (NB)	Power Pole	Relocate
	454+00 to 458+00	Electronic Sensor System	Protect in Place
	455+30 (NB)	Power Pole	Relocate
	458+90 (NB)	Power Pole	Relocate
	460+60 (NB)	Power Pole	Relocate
	462+30 (NB)	Power Pole	Relocate
	464+30 (NB)	Power Pole	Relocate
U-15	466+70 (NB)	Power Pole	Relocate
	466+80 (NB)	Fire Hydrant	Relocate
	469+00 (NB)	Power Pole	Relocate
	470+30 (NB)	Edison Power Boxes	Relocate
	471+00 (NB)	Power Pole	Relocate
	471+90 (NB)	Edison Power Boxes	Relocate
	472+20 (NB)	Power Pole	Relocate
	473+80 (NB)	Power Pole	Relocate
	475+50 (NB)	Power Pole	Relocate
U-16	NO IMPACTS		
U-17	NO IMPACTS		
U-18	NO IMPACTS		
U-19	NO IMPACTS		
U-20	NO IMPACTS		

6.15 RETAINING WALLS

Retaining walls will be required to retain new embankment fills for the outboard widening, or to retain abutments of OCs. 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. Retaining wall improvements may include:

- Tieback walls at west and east abutments of Warner Avenue OC.
- Type 1 or similar wall, up to 10 feet high, north of Dyer Rd. UC to retain new fill adjacent to existing antenna.
- Type 1 or MSE walls where outboard embankments are required and limited right-of-way is available for the new auxiliary or GP lanes.
- Additional walls may be required at the abutments and HOV drop ramps of the future proposed Alton Ave. OC and drop ramps, or in other portions of the project.
- A Type 1 retaining wall with Type 736 concrete barrier would be constructed along SR-55 between the Dyer Rd. UC and approximately 1000’ south of the gore point of the West Dyer Rd. off-ramp to Grand Ave.
- A Type 736 concrete barrier with a chain link fence behind the barrier would be constructed along SB SR-55 between the west Dyer Rd. off-ramp to Grand Ave. and the Edinger Ave. on-ramp at various locations.
- A Type 1 retaining wall with a Type 60D concrete barrier would be constructed along SB SR-55 at the Warner Avenue OC.
- A Type 60C concrete barrier with chain link fence would be constructed along SB SR-55 and Ritchy Street, to separate the frontage road traffic and SB SR-55.
- In the median area of SB SR-55, between the SB Warner Avenue OC and the Edinger Ave. on-ramp, the existing Type K concrete barrier would be removed and replaced with a Type 60 concrete barrier.

6.16 FILLS

Placement of new fills may add new load to existing buried drainage facilities. Where embankments are placed above existing open channels, slope stability will need to be evaluated. The following channels, and others, may be affected:

- OCFCD open trapezoidal concrete channel (Lane Channel) west of SR-55 between MacArthur Blvd. and Dyer Rd. , and passing below the freeway north of MacArthur Blvd., may be impacted by placement of additional fills;
- Existing 8 ft. x 4 ft. RCB west of SR-55 between SB Dyer Rd. off-ramp and SB Edinger Ave. on-ramp may be loaded with additional fills; and
- Embankments placed at the South Tustin OH north abutment may impact the Santa Ana Santa Fe Channel, which crosses SR-55 in an 8 ft. x 8 ft. RCB between Bent 3 and Abutment 4.

6.17 RAMP TERMINI AND MAINTENANCE VEHICLE PULLOUT (MVP)

Portland Cement Concrete (PCC) ramp termini would be constructed at the NB McFadden Ave. off-ramp.

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

- SB East MacArthur Blvd. on-ramp
- SB MacArthur Blvd. off-ramp
- SB Dyer Rd. on-ramp
- SB East Dyer Rd. off-ramps
- SB Edinger Ave. on-ramp
- SB Edinger Ave. off-ramp
- SB between MacArthur Blvd. on- and off-ramp (Mainline)
- SB between Edinger Ave. on- and off-ramp (Mainline)
- NB West MacArthur Blvd. on-ramp
- NB MacArthur Blvd. off-ramp
- NB West Dyer Rd. on-ramp
- NB McFadden Ave. Ave on-ramp
- NB between Dyer Rd. off- and on-ramp (Mainline)

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.

6.18 RAMP METERING

All 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, 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 an auxiliary lane on the mainline. Loop detectors should be installed; centered on each lane. Loop detectors, closed-caption television (CCTV), CMS, transportation management system (TMS), ramp metering system (RMS), and fiber optics should be operated during construction. Adaptive ramp metering system (ARMS) and lane gantry management signs will be incorporated as a part of PS&E.

6.19 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.

6.20 GEOTECHNICAL ASSESSMENT SITE AND SUBSURFACE CONDITIONS

6.20.1 Site Conditions

Site topography is a relatively level alluvial plain with natural ground elevations rising gradually at about ½% gradient from El. +35 ft. near MacArthur Blvd. to El. +125 feet near the I-5/SR-55 interchange (see the separately bound Geotechnical Assessment Report). The alignment is generally near the original site grades, except where fill embankments and retaining walls have been constructed to facilitate the grade separations at OCs and UCs.

6.20.2 Geology

The site is located within the Tustin 7.5-Minute Quadrangle. The Tustin Quadrangle covers an area of about 60 square miles of Orange County land near the southeastern edge of the Los Angeles Basin. The SR-55 project is located in the nearly flat-lying area of the Tustin Plain. The basin area consists of a sequence of flat-lying basin sediments and Holocene or modern fluvial deposits. Younger fan deposits, which include floodplain deposits, generally consist of unconsolidated sand, sandy silt, silt, and lean to fat clays of Santa Ana River, Santiago Creek, and Peters Creek origin. The only units mapped in this quadrangle as artificial fill are earth-filled dam embankments and highway-related engineered fills (Reference: California Department of Conservation, Division of Mines and Geology, “Seismic Hazard Zone Report for the Tustin 7.5-Minute Quadrangle, Orange County, California,” 1998). Generally, soils are interbedded alluvial sands, silts, clays, and gravels that increase in density and stiffness with depth.

6.20.3 Subsurface Data from As-Built Log of Test Borings at Bridges

Subsurface conditions in the area generally consist of relatively shallow (up to a maximum of about 20 to 30 feet high) man-placed fills at abutment approaches overlying young unconsolidated alluvial soils deposited by alluvial fans of the San Diego Creek and Peters Creek. Older more consolidated alluvial deposits are present at depth, underlying the less consolidated deposits. The upper 30 to 40 feet of native alluvial soils are typically loose to medium dense granular soils, interbedded with soft to stiff cohesive soils. Below 30 to 40 feet, granular soils are generally medium dense to dense, and cohesive soils are typically stiff to very stiff.

The as-built log-of-test-borings (LOTB) data indicates that the alluvial materials are primarily interbedded sands (SP, SP-SM); silty sands (SM), sandy silts and silts (ML), clayey silts (ML-CL), and silty clays to lean to fat clays (CL/CH). The layering of materials varies by location. As-built LOTBs for the bridges are presented in Figures 5A through 5L. Standard Penetration Test (SPT) blowcounts or “N-Values” (blows per foot) were used to estimate the relative density or consistency of the soils. A generalization of subsurface conditions from the as-built LOTBs is presented in the following sections.

6.20.4 Liquefaction Potential

Soils in the entire project alignment are poorly consolidated Quaternary alluvial sediments, and groundwater levels are relatively shallow, ranging from about 5 to 23 feet in depth. Therefore, the entire site from MacArthur Blvd. to McFadden Ave. is located in a mapped liquefaction hazard zone, as shown in the separately bound Geotechnical Assessment report. Thus, a site-specific liquefaction evaluation is required and may affect design of structures for the project. Potential key issues include ground settlement, down drag loads on piles, reduced pile lateral capacity, and lateral spreading of embankments.

Only preliminary assessment of liquefaction potential was made based on examination of available soil classifications, SPT blow count data, and relative density descriptions of saturated cohesionless deposits from previous LOTBs. For final design new borings with SPT blow count, fines content, Atterberg Limits, and groundwater measurements, and Cone Penetration Tests (CPTs), are recommended for all

bridge, wall, other structures, and embankment areas. CPTs are considered essential for good liquefaction evaluation, due to the highly interbedded sand/clay profiles common along SR-55. Accurate determination of thickness and density of liquefiable layers is key to an accurate prediction of liquefaction impacts.

6.20.5 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 as shown below in Table 52 and 53 are obtained from approved previous reports for consistency.

Table 51: Proposed Pavements on SB SR-55

SR-55 SB			
Begin Station	**End Station**	**Roadway Section**	**Previously Proposed Pavement Sections**
3+77 "DY-2"	14+01 "DY-2"	E. Dyer Rd. off-ramp	0.60-ft AC (Type A) / 0.60-ft ACB (Type A) / 1.30-ft AS (Class 2)
24+05 "DY-3"	32+24 "DY-3"	W. Dyer Rd. off-ramp	0.60-ft AC (Type A) / 0.60-ft ACB (Type A) / 1.30-ft AS (Class 2)
81+21 "ED-1"	91+00 "ED-1"	Edinger Ave. on-ramp	0.60-ft AC (Type A) / 0.60-ft ACB (Type A) / 1.30-ft AS (Class 2)
407+00 "CL-55"	492+00 "CL-55"	SB HOV + 2 GP	0.20-ft RAC-G / 0.55-ft AC (Type A) / 0.65-ft ACB / 1.70-ft AS (Class 2)
		SB Aux + 1 to 2 GP	

Table 52: Proposed Pavements on NB SR-55

SR-55 NB					
Begin Station	**End Station**	**Roadway Section**	**Previously Proposed Pavement Sections**		
			Travel Lanes	**Ramps**	**Shoulders**
8+43 "DY-5"	26+43 "DY-5"	E. Dyer Rd. on-ramp	-	0.60-ft AC (Type A) / 0.60-ft ACB / 1.30-ft AS (Class 2)	0.40-ft AC (Type A) / 0.45-ft ACB / 1.0-ft AS (Class 2)
17+31 "DY-4"	26+43 "DY-4"	W. Dyer Rd. on-ramp	-	0.60-ft AC (Type A) / 0.60-ft ACB / 1.30-ft AS (Class 2)	0.40-ft AC (Type A) / 0.45-ft ACB / 1.0-ft AS (Class 2)
401+00 "CL-55"	477+00 "CL-55"	NB HOV + 2 GP	0.70-ft AC (Type A) / 0.25-ft CTPB / 0.55-ft ACB / 1.65-ft AS (Class 2)	0.60-ft AC (Type A) / 0.60-ft ACB / 1.30-ft AS (Class 2)	0.40-ft AC (Type A) / 0.45-ft ACB / 1.0-ft AS (Class 2)
		NB Aux + 1 to 2 GP			

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 HDM (September 1, 2006), considering the actual tested R-Value of the site subgrade and the design traffic index. Near surface alluvial soils are interbedded sands, silts, and clays. R-Value of these materials is expected to highly variable and likely ranges from low for clays (less than 10) to moderate for sand/silt/clay mixtures (10 to 40). Limited data is available on abutment approach fills (only at MacArthur Blvd.), but indicates these materials are silty sands which may have moderate (10 to 40) to high R-Value (>40).

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 indicate the presence of a drainage layer and edge drain for the 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 723.1E 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 Project Report phase, detailed analysis of the edge drain system with new pavement sections will be engineered to intercept the existing drainage system under the existing shoulders.

In addition, 1” 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. 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.

6.21 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.

6.22 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.

6.23 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.

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 Tustin, Irvine, and Santa Ana representatives (Public Works Directors, Transportation Manager, and Deputy Civil Engineers) were included in Purpose and Need developments and Alternatives discussions at PDT meeting. Formal public hearings will be organized for 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). A site survey and database search were performed and found no Recognized Environmental Conditions (RECs) at the site and immediately adjacent areas except as follows:

- Distressed vegetation at four locations along the NB side of the freeway and several locations along the SB side of the freeway;
- Pile of construction debris and soil stockpiles at Edinger Ave. NB on-ramp and off-ramp;

- Aerially deposited lead (ADL) and agricultural chemicals in the shallow soil of unpaved sections next to the freeway;
- One Department Of Defense (DOD) facility (former Tustin Marine Corps Air Station);
- One Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) property;
- Twenty two Leaking Underground Storage Tank (LUST);
- Four drycleaners near the freeway of which two dry cleaning facilities (Sunny Hills Cleaners and Fletcher Cleaners) are located adjacent to the SR-55 SB widening; and
- Two right-of-way acquisition properties (O'Neil Moving Storage and Niagara Drinking Water) listed under LUST database and one right-of-way acquisition property (Grainger) listed under UST database.

Additional ISA work, including aerially-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. Refer to the Hazardous Waste ISA for further information (bound separately).

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).

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.

8.2 NPDES PERMIT COMPLIANCE/WATER QUALITY

OCTA will need to submit notification to the State Water Resources Control Board (SWRCB) for coverage under the National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activity (Order No. 99-08-DWQ, NPDES No. CAS000002) and any subsequent General Permit in effect a minimum of 30 days prior to start of construction. In addition, when applicable, the project must comply with the NPDES Permits for 1) the County of Orange, Orange County Flood Control District and the Incorporated Cities Within the Santa Ana Region (Order No. R8-2002-0010, NPDES No. CAS618030), and 2) the Statewide Storm Water Permit and Waste Discharge Requirements (WDRs) for Caltrans, (Order No.99-06, NPDES No. CAS000003), and any subsequent Statewide Permit in effect at the time. Application to the Santa Ana Regional Water Quality Control Board for coverage under the De Minimus Permit may be necessary for dewatering during construction of bridges; this application process requires a three month lead time.

As part of the Caltrans Storm Water Management Program, Construction Site, Design Pollution Prevention and Treatment Best Management Practices (BMPs) will be implemented to minimize potential water pollution during construction and future operation of the proposed project. Construction site BMPs will be detailed in and implemented via the Storm Water Pollution Prevention Plan (SWPPP), except for those BMPs determined to be "critical" which will be identified in the PA/ED phase and detailed in the

PS&E phase. Design Pollution Prevention and Treatment BMPs must be evaluated and selected for incorporation into the project design during the PA/ED phase. A Water Quality Assessment Report will be required.

The evaluation and documentation for these measures will be included in the Storm Water Data Report (SWDR) for the PA/ED phase.

Special considerations for construction activities must be applied during the rainy season (October 1 through May 1) to avoid impacts and impairments to the Santa Ana River and its tributaries.

The Capital Outlay Support estimate under Section 9 of this report includes the Cost for Engineering and Environmental Support for NPDES compliance. The following technical reports will be prepared during PA/ED and PS&E phases:

1) Storm Water Data Report
2) Floodplain Evaluation Report
3) Geotechnical (Soils & Water) Assessment
4) Aerially Deposited Lead (ADL) Investigation

Receiving Water Bodies: The receiving water bodies are the San Diego Creek Reach 1 and the Upper and Lower Newport Bay. The hydrologic sub-area is the east coastal plain of the hydrologic area lower Santa Ana River. Two waterways are located within the project vicinity, the Lane Channel, Orange County Facility F08, and the Santa Ana/Santa Fe Channel, Orange County Facility F10. The Lane Channel is adjacent to the west side of SR-55 between the MacArthur Blvd. and the Dyer Rd. interchanges, crosses SR-55 just north of the MacArthur Blvd. interchange, and is adjacent to the north side of MacArthur Blvd. before joining San Diego Creek Reach 1, Orange County Facility F05, which flows to Upper Newport Bay. The Santa Ana/Santa Fe Channel crosses SR-55 between the Edinger Ave. and McFadden Ave. interchanges, parallels the north side of the SCRRA railroad tracks and Edinger Ave. before joining Peters Canyon Wash, Orange County Facility F06, which drains to San Diego Creek, Reach 1. San Diego Creek drains into the Upper Newport Bay, Lower Newport Bay, and ultimately to the Pacific Ocean.

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.

Drinking Water Reservoirs and/or Recharge Facilities: There are no locations within the project right-of-way where spill could discharge directly to municipal or domestic water supply reservoirs or groundwater percolation facilities.

RWQCB Special Requirements/Concerns: The project is located within the Santa Ana Regional Water Quality Control Board (Region 8). It is not known at this time if special requirements for this project are required by the RWQCB.

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.

Project Design Considerations:

- Climate: The project is located in the central portion of Orange County which is generally characterized by hot, dry summers and cool, wet winters followed and preceded by pleasant and generally warm spring and fall seasons. The temperature ranges between 44 degrees and 77 degrees during the months of November through April. During the months of May through October, the temperature ranges between 54 and 86 degrees. The average annual rainfall in the region is 13 inches, with wide annual variations and most of the precipitation falling between the months from November to 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 runoff from areas discharging to flow-based treatment BMPs is 0.2” per hour.

- Floodplain: As noted above, two waterways are located in the project vicinity. Both channels 100-year floodplains have been studied by the Federal Emergency Management Agency (FEMA) and results are published on their February 2004 Flood Insurance Rate Maps (FIRM) 06059C0278H and 06059C0277H. The FIRMs show the 100-year floodplain is contained entirely within both channels. Therefore, the project would need to maintain the existing capacities of the Lane Channel and Santa Ana/Santa Fe Channel since the freeway runoff drains to these facilities.

- Noise: According to the Traffic Noise Analysis Protocol, this project is a type 1 project, and requires traffic noise impact evaluation for all alternatives. Field investigation reveals that this project does not pass the screening procedure as defined in the Noise Analysis Screening Procedure Checklist; therefore, a detail noise analysis should be performed during the environmental phase of the project.

- Soils, Geology: Soils within the project area are classified by NRCS Group B north of Edinger Ave., Group C between MacArthur Blvd. and Edinger Ave. and on the east side of SR-55 from I-405 to MacArthur Blvd., and Group D south of MacArthur Blvd. and west of the SR-55 to I-405. Group B soils are generally characterized by having moderate infiltration rates when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately well to well drained sandy-loam soils with moderately fine to moderately coarse textures.

Group C soils are generally characterized by having slow infiltration rates when thoroughly wetted and consisting chiefly of silty-loam soils with a layer that impedes downward movement of water, or soils with moderately fine to fine texture. Group D soils have very slow infiltration rates when thoroughly wetted and consisting chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material.

- Topography: The project is located on a relatively flat alluvial plain formed by San Diego Creek, Peters Creek, and their tributaries. The terrain slopes at a rate of ½ percent in a northeast to southwest direction.

- Groundwater: Based on the California Geological Survey Seismic Hazard Evaluation, the highest historical groundwater at the site is 10 foot depth and shallower between MacArthur Blvd. and Dyer Rd. , 10-20 feet deep between Dyer Rd. and Edinger Ave., and greater than 40’ at the I-5/SR-55 interchange. Groundwater generally flows northeast. Based on previous borings at the bridge locations along SR-55, the groundwater depth was 6 feet at Warner Ave., 23 feet at McFadden Ave. Near the Lane Channel and Santa Ana/Santa Fe Channel, groundwater depth of less than 27’ may be encountered. Geotechnical data does not include soil permeability rates at this time. Soil permeability will vary between 0.15 to 0.30 inch per hour, based upon expected rates for NRCS Soils Type B and C in Table B-3 of Storm Water Handbook, Project Planning Design Guide (PPDG).

- 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 upon the alternative selected. Alternative 1 will require the least amount of additional right-of-way; Alternative 3 will require the most additional right-of-way. TCE will be required for all alternatives. A description of the additional right-of-way locations is included above in the project description. A right-of-way certification will be required. The acquisition of right-of-way for design, construction, and maintenance BMPs is not anticipated; however this will be confirmed in the subsequent project development phases. No staging areas outside of the proposed right-of-way 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.

- Right-of-way Costs for BMPs: 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 existing land use adjacent to SR-55 consists of office, commercial, industrial, and residential uses.

- Dry Weather Flows: Dry weather flows are not persistent within the project segment.

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 treatment BMPs within the project limits.

8.3 ENVIRONMENTAL STATUS

This Preliminary Environmental Analysis Report (PEAR), see ATTACHMENT 2, 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 Understating 6004 and 6005 [effective July 1, 2007]).

The PEAR concludes that an IS/MND would be the appropriate level of environmental documentation under CEQA and an EA/FONSI would be the appropriate level of environmental documentation under NEPA. The anticipated environmental compliance timeframe is 18–24 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.

***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.
- 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.

Water Quality Permitting: 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 Santa Ana 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)
- SARWQCB Dewatering Permit

8.5.1 U.S Army Corps of Engineers Section 404 Permit

If the project involves the discharge of fill into or alterations of the Lane Channel at Alton Ave. or Santa Ana/Santa Fe, a Nationwide Permit (NWP) 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) would require an individual permit from the Corps.

8.5.2 California Department of Fish and Games Streambed Alteration 1601 Agreement

If the California Department of Fish and Game determines that the project could substantially affect an existing fish and wildlife resource, a Streambed Alteration Agreement is required.

8.5.3 Regional Water Quality Control Board 401 Certification

The project is located within the jurisdiction of the SARWQCB. 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.

9. FUNDING

The proposed project is currently funded with an estimated $366 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. Additionally, the two SB auxiliary lanes from Edinger Ave. to Dyer Rd. and from Dyer Rd. to MacArthur Blvd. (EA 0G960K and EA 0E2500) are fully funded.

The project will also seek federal and other additional funding sources. A draft cooperative agreement outlining the roles and responsibilities of OCTA and Caltrans for the PA/ED phase is included as Attachment 6.

This project will be a candidate for programming PA/ED and PS&E capital outlay support only in the 2009/2010 State Transportation Improvement Program (STIP). The table below shows a summary of the approximate capital and support costs for this project.

Table 53: Capital Outlay Estimate

Alternative	Capital Construction Cost* (million)	Right-of-way Cost (million)	Total Project Cost (million)
1	$71.09	$32.24	$103.33
2	$87.83	$39.66	$127.49
3	$137.12	$72.51	$209.63
5	$125.48	$54.47	$179.95

**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 54: Capital Outlay Support Estimate for PA/ED and PS&E

Fiscal Year	OCTA PY's/$'s	
	PY's	$'s
2008/10 (PA/ED)	30	$5,250,000
2010/12 (PS&E)	45	$7,875,000
2012/13 (Right-of-Way Support)	12	$2,100,000
2013/15 (CM)	40	$7,000,000
Total Support/Cost	127	$22,225,000

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.

Table 55: Tentative Project Schedule

Milestone Schedule	Completion Date
Begin PSR/PDS	August 2007
Complete PSR/PDS	October 2008
Begin PA/ED (20 months)	March 2009
Public Hearing	March 2010
Final PA/ED	November 2010
Begin PS&E	February 2011
End PS&E	June 2012
Right-of-way certification (12 months)	January 2012 to January 2013
Ready to list (3 months)	April 2013
Advertisement and contract award (5 months)	July 2013
Begin construction (24 months)	December 2013
Construction Completion	December 2015

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.

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 proposed 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 SR-55 from I-405 to I-5. During the peak periods, both directions of the freeway have varying levels of congestion during the periods of 5:00 AM through 9:00 AM and 3:00 PM through 7:00 PM. Congested conditions are particularly heavy in the NB direction of travel during the PM peak period and in the SB direction of travel during the AM peak period. As growth continues in the Southern California region, the SR-55 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 SR-55, the project alternative is expected to reduce the amount of traffic using parallel arterials (particularly Red Hill Avenue). The OCTAM traffic demand model forecasts that between 2007 and 2035 an increase in traffic demand on the order of 500 to 750 vehicles per hour will occur during AM and PM peak hours. Since SR-55 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 2035 and no practical improvements could be implemented to reduce traffic congestion along these arterials. For this reason, any operational improvements made along SR-55 will be beneficial for the parallel arterials.

Based on our analysis, Alternatives 2, 3, and 5 will enhance the capacity of the freeway as well as bring non-standard features of the freeway to current HDM standards. In addition, it will improve operations for both HOV lanes and GP lanes by providing auxiliary lanes to reduce the heavy traffic weaving.

The following is a summary of the improvements that would be accomplished by adding one auxiliary lane and one additional GP lane in both directions of SR-55 from I-405 to I-5:

12.1.1 Northbound

Segment 1 - From the I-405 Connector at SR-55 to MacArthur Blvd. – The addition of one lane will result in a total of five GP lanes and a two-lane exit to MacArthur Blvd.

Segment 2 - From MacArthur Blvd. to Dyer Rd. – The addition of one lane will increase capacity and also provide a two-lane exit to Dyer Rd., improving traffic operations at the ramp junction.

Segment 3 – From Dyer Rd. to Edinger Ave. – The addition of one lane will increase the capacity and also provide a two-lane exit to Edinger Ave., improving traffic operations at the ramp junction.

Segment 4 – From Edinger Ave. to McFadden Ave. – The addition of one lane will provide six lanes which improves the heavy traffic congestion at the NB I-5 connector.

Segment 5- From McFadden Ave. to I-5 NB/SB Connectors - The addition of one lane will provide six lanes which provides complete two lanes to I-5 NB connector rather than the existing condition where one lane is shared with drop offs to the SB I-5 connector. Due to the existing sound wall and the existing closed end abutment at McFadden Ave., the right shoulder must be reduced from ten feet to eight feet for

approximately 500’ within the vicinity of existing abutment. Non-standard features are listed under EXHIBIT M.

12.1.2 Southbound

Segment 1 - From the I-5 SB Connector at SR-55 to McFadden Ave. – By converting the existing auxiliary lane to an additional GP lane, the freeway capacity is increased. In addition, the weaving distance is increased for I-5 SB traffic to merge more easily with SB SR-55 traffic. This increase in weaving distance will enhance the weaving LOS within this section of freeway. However, the Project Report shall further study the removal of the existing sound wall along the right shoulder in order to merge the NB I-5 loop on-ramp creating its own dedicated lane to merge to SR-55. This option will require non-standard right shoulder and reduced lane width (11’).

This conceptual improvement should be analyzed in detail to improve the restricted geometrics at this important connector location.

Segment 2 - From McFadden Ave. to Edinger Ave. – The addition of one lane will increase the capacity and provide an auxiliary lane to existing Edinger Ave.

Segment 3 – From Edinger Ave to Dyer Rd. – The addition of one lane will increase capacity and provide the auxiliary lane to exit.

Segment 4 – From Dyer Rd. to MacArthur Blvd – The addition of one lane will increase capacity and provide a two-lane exit to MacArthur Blvd.

Segment 5- From MacArthur Blvd to I-405 NB/SB connectors -The addition of one lane will increase capacity at this heavily congested area while providing a two-lane exit to SB I-405 instead of sharing a lane with the NB I-405 connector. With proper signage, existing traffic to NB I-405 can be redirected to utilize the WB MacArthur Blvd. loop on-ramp (T- intersection of loop on-ramp). This minor modification will improve the traffic congestion substantially since it removes the traffic conflict at the I-405 NB/SB connector. In summary, NB I-405 traffic will be utilizing the loop on-ramp and the SB I-405 traffic will be utilizing the direct on-ramp.

12.2 OTHER CONSIDERATIONS

12.2.1 Alton Ave OC and HOV Drop Ramps

The Alton Ave. OC and HOV drop ramps Project Report (PR) EA 005500 was approved in 2006 to provide a new OC at Alton Ave. and future HOV drop ramps. This project would require the shifting of the SR-55 mainline westerly. The Alton Ave. OC project is assumed to be constructed by others, and therefore, all associated related technical reports such as the Traffic Report, Drainage Impact Report, PEAR, Utility and Right-of-way Data Sheet, and Cost Estimate are not included in this project. The plans are integrated in this corridor study as part of the Baseline Project from MacArthur Blvd. to Dyer Rd. for reference purposes only to provide continuity to/from the I-405 HOV direct connectors.

The existing “Lane Channel” relocation / reconstruction, as part of the Alton Ave. OC and HOV drop ramps project, will be relocated and jacked under the existing freeway per the proposed PA/ED plans by others.

The Alton Ave. OC and HOV drop ramps project is anticipated to commence the final design phase in late 2008. As part of this effort, OCTA, Caltrans, and the cities of Irvine and Santa Ana are reassessing the need to proceed with the construction of the drop ramps component of the project. As part of the

reassessment of the drop ramps, the cities of Irvine and Santa Ana amended the final design phase to analyze two options:

1) Design of the OC with the drop ramps; and
2) Design of the OC without the drop ramps.

Pending the outcome of this analysis, particularly under the second aforementioned option, the SR-55 widening project geometrics and cost would be affected. If the Alton Ave. OC and HOV drop ramps project changes its scope with respect to elimination of the drop ramps, the SR-55 widening project would need to change the geometric assumptions and reassess the costs during the PA/ED phase.

12.2.2 Future Improvements at Existing I-5/SR-55

OCTA has programmed to reduce the traffic congestion at I-5 / SR-55 between the Fourth St. and Newport Blvd. ramps on I-5, and between Fourth St. and Edinger Ave. on SR-55 (freeway to freeway limit) under Measure M2, identified as Project "A". This project will increase freeway capacity and reduce congestion using federal and state funds. However, if operational analysis shows the weaving distance from NB McFadden Ave. to NB SR-55 through the I-5 connectors has operational constrains and the ultimate pavement as shown in Alternatives 2 through 5 should be constructed, then pavement striping shall follow Alternative 1 until the ultimate SR-55 /I-5 , Project "A" is constructed. Therefore, the proposed improvements along SR-55 corridor will provide additional capacity for the entire corridor terminating to the south of the existing I-5 connectors since Project "A" at this location is programmed by OCTA in partnership with Caltrans. This area shall be further studied in detail and a determination shall be made during the PA/ED phase.

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