

Interstate-405 Improvement Project

Qualitative Hot-Spot Analysis

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Prepared By: Terry A. Hayes Associates Inc.
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Section 1. Introduction

This qualitative hot-spot analysis contains the information that is required to make a project-level air quality conformity determination for the Interstate (I)-405 Improvement Project. This analysis has been prepared to be consistent with information published by Federal Highway Administration (FHWA) related to Project-Level Conformity Analysis, applicable United States Environmental Protection Agency (U.S. EPA) project-level analysis guidance, the Transportation Conformity Regulations at 40 Code of Federal Regulations (CFR) 93 Subpart A, and Section 176(c) of the Federal Clean Air Act (42 United States Code [USC] 7506(c)).

This analysis only addresses the conformity requirements of the Federal Clean Air Act. It does not address general air quality analysis or studies conducted for the National Environmental Policy Act (NEPA) or the California Environmental Quality Act (CEQA), and only address pollutants for which the project area is designated nonattainment or attainment with an approved Maintenance State Implementation Plan (SIP), by the U.S. EPA.

This report is intended to provide all information needed by FHWA to make a project-level conformity determination for a project that falls under 23 USC 327 NEPA Assignment to California Department of Transportation (Caltrans); or to support a full project-level conformity determination by Caltrans under 23 CFR 326 NEPA Assignment for projects that require a project-level conformity determination (including regionally significant projects as defined in 40 CFR 93.101), and are categorically excluded from NEPA analysis under 23 CFR 771.117(c)(22) or 23 CFR 771.117(c)(23).

1.1. Project Description

The I-405 Improvement Project proposes to improve the mainline freeway and interchanges on I-405 in Orange and Los Angeles Counties. The proposed project would relieve congestion and improve operational efficiency on I-405 between State Route (SR)-73 and I-605. The approximately 16-mile-long project corridor is primarily located in Orange County on I-405 and traverses the Cities of Costa Mesa, Fountain Valley, Huntington Beach, Westminster, Garden Grove, Seal Beach, Los Alamitos, Long Beach, and the community of Rossmoor (see Figure 1).



Figure 1. Project Location Map

The project limits extend from 0.2-miles south of Bristol Street (12-ORA-405 Post Mile [PM] 9.3) to the Orange County/Los Angeles County line (12-ORA-405 PM 24.2) and in Los Angeles County from the County line (07-LA-405 PM 0.00) to 1.4 miles north of I-605 (07-LA-405 PM 1.2). Improvements are proposed on SR-22 West in Orange County from 0.2-miles west of I-605 (12-ORA-22 PM R0.5) to I-405 (12-ORA-22 PM R0.7) and on SR-22 East in Orange County from I-405 (12-ORA-22 PM R0.7) to 0.2-miles east of the Beach Boulevard Undercrossing (12-ORA-22 PM R3.8). Improvements on SR-73 will be from the Bear Street Overcrossing (12-ORA-73 PM R27.2) to I-405 (12-ORA-73 PM R27.8). Improvements on I-605 in Orange County will be from I-405 (12-ORA-605 PM 3.5) to the County line (12-ORA-605 PM R1.6) and in Los Angeles County from the County line (07-LA-605 PM R0.0) to 0.9-mile north of the Spring Street Overcrossing (07-LA-605 PM R1.2). Encroachments into Los Angeles County and work on SR-22 are associated with signing and striping to accommodate the transition from the existing to the proposed facility. I-405 is currently a controlled-access highway facility with 8 to 12 mixed-flow General Purpose (GP) lanes and two High Occupancy Vehicle (HOV) lanes, which is over capacity and subject to traffic congestion and travel delays.

I-405 is generally a north-south route with 24 miles in Orange County and 48 miles in Los Angeles County. I-405 is part of the National Highway System and is considered a bypass route to I-5 (the Santa Ana/Golden State Freeway) providing intra-regional and inter-regional access between Orange and Los Angeles Counties. I-405 also serves as a critical goods movement corridor connecting the San Diego and United States/Mexico border region with the ports of Long Beach and Los Angeles.

Within the project limits, I-405 connects with SR-73 at the southern end and with I-605 at the northern end, and for approximately 2 miles between Bolsa Chica Road and I-605, it overlaps with SR-22. Fifteen (15) local street interchanges and three freeway-to-freeway interchanges are within the limits of the project improvements.

Alternative 3 is the preferred alternative with an open-to-traffic year of 2020. Alternative 3 would add one GP lane in each direction on I-405 from Euclid Street to the I-605 interchange, plus add a tolled Express Lane in each direction of I-405 from SR-73 to SR-22 East. The tolled Express Lane and the existing HOV lanes would be managed jointly as a tolled Express Facility with two lanes in each direction from SR-73 to I-605. The proposed project would provide a full standard highway cross section, with 12-foot-wide mainline travel lanes and shoulders on the left and right sides in both directions. Right side (outside) shoulders would be 10-foot-wide, while left side (inside) shoulders would have a maximum width of 10 feet with a provision for a

widened left shoulder for enforcement areas under consideration. The tolled Express Facility would be separated from the GP lanes by a 1- to 4-foot buffer.

It is anticipated that the total construction period along the length of the alignment would be 54 months (4.5 years). Using information from the Road Construction Emissions Model created by the Sacramento Metropolitan Air Quality Management District, the anticipated construction phases and duration are as follows:

- Grubbing/Land Clearing - 5.4 month
- Grading/Excavation - 24.3 months
- Drainage/Utilities/Sub-Grade - 16.2 months
- Paving - 8.1 months

1.2. Air Quality Regulatory Framework

Table 1 shows that the proposed project is located in an area that is nonattainment for ozone (O₃) and particulate matter 2.5 microns or less in diameter (PM_{2.5}) and attainment-maintenance for nitrogen dioxide (NO₂), carbon monoxide (CO), and particulate matter 10 microns or less in diameter (PM₁₀). This analysis focuses on these criteria pollutant(s). The conformity process does not address pollutants for which the area is attainment/unclassified, mobile source air toxics, other toxic air contaminants or hazardous air pollutants, or greenhouse gases. A map of the nonattainment and maintenance boundary area is included in Appendix A.

Table 1. Project Area Attainment Status

Criteria Pollutant	Federal Attainment Status
Ozone	Nonattainment (Extreme)
Nitrogen Dioxide	Maintenance
Carbon Monoxide	Maintenance
Particulate Matter (PM ₁₀)	Maintenance
Particulate Matter (PM _{2.5})	Nonattainment (Moderate)

Source: U.S. Environmental Protection Agency, *The Green Book Nonattainment Areas for Criteria Pollutants*, accessed October 2, 2014 (http://www.epa.gov/airquality/greenbook/anay_ca.html, <http://www.epa.gov/airquality/greenbook/ancl.html#CALIFORNIA>).

Section 2. Localized Conformity

Localized analyses have been prepared for ~~the baseline/existing conditions (2009)~~, open-to-traffic year (2020) and 20-year horizon (2040). It is acknowledged that the Southern California Association of Governments (SCAG) 2012-2035 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) horizon year is 2035. Project-specific traffic data is not available for 2035, although EMFAC2011 2035 emission rates were used with 2040 traffic data.

2.1. Carbon Monoxide Hot-Spot Analysis and Modeling Procedures

The ambient air quality effects of project-related traffic emissions were evaluated using the CALINE4 dispersion model (Benson 1989). Vehicle emission rates were determined using the California Air Resources Board's EMFAC2011 emission rate program.

Roadway and Traffic Conditions

Traffic volumes and operating conditions used in the modeling were obtained from the traffic analysis prepared for this project. Carbon monoxide modeling was conducted using worst-case a.m. or p.m. peak-hour traffic volumes. The peak hour used was chosen to represent the one with the most stable meteorological conditions.

Carbon monoxide modeling was performed for the following scenarios:

- Open-to-traffic year (2020) with project, and
- 20-year horizon year horizon (2040) with project.

Vehicle Emission Rates

Vehicle emission rates were determined using the California Air Resources Board's EMFAC2011 emission rate program.

Receptor Locations

CO concentrations were estimated at eight receptor locations (sidewalk corners) located near a sample of the most congested intersections affected by the project. The regional locations of the intersections in relationship to the alignment are shown in Figure 2 and include the following:

- Bristol Street and I-405 NB Off-Ramp/South Coast Plaza
- Euclid Street and I-405 NB Ramps/Newhope Street
- I-405 SB Ramps and Ellis Avenue
- Magnolia Street and Warner Avenue
- Beach Boulevard and McFadden Avenue
- Beach Boulevard and I-405 SB Ramps
- Goldenwest Street and Bolsa Avenue
- Springdale Street and Westminster Boulevard
- I-405 NB Off-Ramps/SR-22 EB Ramps and Garden Grove Boulevard
- Seal Beach Boulevard and I-405 SB Ramps

Figure 2: CO Modeling Network and Receptors

Receptors were chosen based on Caltrans' CO Protocol. Receptor heights were set at approximately 10 feet (3 meter) for a 1-hour analysis and approximately 23 feet (7 meter) for an 8-hour analysis. U.S. EPA modeling guidance suggests that receptors normally be chosen to be around breathing height (1.8 meters).

Meteorological Conditions

Meteorological inputs to the CALINE4 model were determined using the methodology recommended in the CO Protocol (Garza et al. 1997). The meteorological conditions used in the modeling represent a calm winter period. The worst-case wind angles option was used to determine a worst-case concentration for each receptor. The meteorological inputs include:

- 1.0 meters per second wind speed;
- F(6) stability class ground-level temperature inversion;
- 10 degree wind direction standard deviation; and
- 1,000 meter mixing height.

Background Concentrations and 8-Hour Values

A background concentration of 2.4 parts per million (ppm) was added to the modeled 1-hour values to account for sources of CO not included in the modeling. Eight-hour modeled values were calculated from the 1-hour values using a persistence factor of 0.7. A background concentration of 1.7 ppm was added to the modeled 8-hour values. The CO background concentration was taken from the monitoring data provided by the California Air Resources Board for the Costa Mesa Monitoring Station.

The CO air quality modeling results for 2020 and 2040 are shown in Tables 2 and 3, respectively. One-hour CO concentrations under project conditions would be approximately 4.6 ppm at worst-case sidewalk receptors in the year 2020, and 4.1 ppm in 2040. Eight-hour CO concentrations under project conditions would be approximately 3.2 ppm at worst-case sidewalk receptors in the year 2020, and 2.9 ppm in 2040. The 1- and 8-hour standards of 35 and 9 ppm, respectively, would not be exceeded at the analyzed intersections. Therefore, the I-405 Improvement Project would not result in a CO hot spot.

Table 2. CO Modeling Results - Opening Year (2020)

Interchange and Intersection	1-hour (parts per million)	8-hour (parts per million)
BRISTOL STREET INTERCHANGE		
Bristol Street and I-405 NB Off-Ramp/South Coast Plaza	4.5	3.2
EUCLID STREET AND ELLIS AVENUE INTERCHANGE		
Euclid Street and I-405 NB Ramps/Newhope Street	4.2	3.0
I-405 SB Ramps and Ellis Avenue	3.8	2.7
MAGNOLIA STREET AND WARNER AVENUE INTERCHANGE		
Magnolia Street and Warner Avenue	4.3	3.0
BEACH BOULEVARD AND EDINGER AVENUE INTERCHANGE		
Beach Boulevard and McFadden Avenue	4.6	3.2
Beach Boulevard and I-405 SB Ramps	4.5	3.2
GOLDENWEST STREET AND BOLSA AVENUE INTERCHANGE		
Goldenwest Street and Bolsa Avenue	4.2	3.0
SPRINGDALE STREET AND WESTMINSTER BOULEVARD INTERCHANGE		
Springdale Street and Westminster Boulevard	4.0	2.8
GOLDENWEST STREET AND BOLSA AVENUE INTERCHANGE		
I-405 NB Off-Ramps/SR-22 EB Ramps and Garden Grove Boulevard	4.3	3.0
SEAL BEACH BOULEVARD INTERCHANGE		
Seal Beach Boulevard and I-405 SB Ramps	4.6	3.2
Federal Standard	35	9

Table 3. CO Modeling Results - Design Year (2040)

Interchange and Intersection	1-hour (parts per million)	8-hour (parts per million)
BRISTOL STREET INTERCHANGE		
Bristol Street and I-405 NB Off-Ramp/South Coast Plaza	3.8	2.7
EUCLID STREET AND ELLIS AVENUE INTERCHANGE		
Euclid Street and I-405 NB Ramps/Newhope Street	3.7	2.6
I-405 SB Ramps and Ellis Avenue	3.5	2.5
MAGNOLIA STREET AND WARNER AVENUE INTERCHANGE		
Magnolia Street and Warner Avenue	3.7	2.6
BEACH BOULEVARD AND EDINGER AVENUE INTERCHANGE		
Beach Boulevard and McFadden Avenue	3.9	2.8
Beach Boulevard and I-405 SB Ramps	4.1	2.9
GOLDENWEST STREET AND BOLSA AVENUE INTERCHANGE		
Goldenwest Street and Bolsa Avenue	3.8	2.7
SPRINGDALE STREET AND WESTMINSTER BOULEVARD INTERCHANGE		
Springdale Street and Westminster Boulevard	3.7	2.6
GOLDENWEST STREET AND BOLSA AVENUE INTERCHANGE		
I-405 NB Off-Ramps/SR-22 EB Ramps and Garden Grove Boulevard	3.5	2.5
SEAL BEACH BOULEVARD INTERCHANGE		
Seal Beach Boulevard and I-405 SB Ramps	3.6	2.5
Federal Standard	35	9

2.2. PM2.5/PM10 Hot-Spot Analysis

Pursuant to Federal Conformity Regulations (specifically, 40 CFR 93.105 [c] [1][i]), a qualitative analysis of the localized PM emissions was conducted following the methodology provided in the U.S. EPA Guidelines as described in Final Rule of March 10, 2006.

U.S. EPA released guidance in 2010 that describes a more detailed analysis process using dispersion modeling that replaces the emission analysis step in the 2006 guidance. All projects with PM10 and/or PM2.5 hot-spot analysis started since December 10, 2012 must use the quantitative analysis procedures in the 2010 guidance. Projects with PM analysis started before December 2012 using the 2006 qualitative analysis procedures must complete both the project-level conformity determination and the Final NEPA document within three years of circulating the draft NEPA document.

Based on emission analysis, the project will not cause, contribute to, or worsen an existing violation of the PM10 24-hour, PM2.5 annual, and PM2.5 24-hour standards. The Build Alternative will produce PM10 and PM2.5 emissions that are lower than No Build, will not reduce level of service (LOS) at intersection with a substantial number of trucks to D or worse, and will not move emissions significantly closer to existing sensitive receptors. Therefore, the project is unlikely to cause or contribute to, or worsen existing, violations of the PM standards.

Analysis Method

This project was determined to be a Project of Localized Air Quality Concern (POAQC) for localized particulate matter (PM10 and PM2.5), based on Interagency Consultation (IAC) concluded on January 25, 2011. The I-405 Improvement Project is considered a POAQC for PM10 and/or PM2.5 because it meets the definition of a POAQC as defined in U.S. EPA's Transportation Conformity Guidance. It falls within the category of new or expanded highway projects with a significant number of diesel vehicles, and it would be affecting intersections that are at LOS D, E, or F with a significant number of diesel vehicles.

Project-level particulate matter analysis was started on January 26, 2011. The Analysis follows the U.S. EPA Guidance of 2006. ~~The analysis is based on comparison of Build Alternative emissions with No Build to determine whether the project is likely to cause or worsen a localized violation of the particulate matter standards. The traffic data for the air quality analysis are derived from data presented and summarized in the I-405 Improvement Project Environmental Impact Report/Environmental Impact Statement as revised for final release.~~

Planning Assumptions

Traffic volumes, fleet mix, and roadway link speeds were determined using traffic analysis developed for this project. Regional travel modeling information was determined in consultation with the Orange County Transportation Authority. Traffic data for the air quality analysis are derived from data presented in the Interstate 405 Improvement Project Traffic Study dated May 2011 and summarized in the San Diego Freeway (I-405) Improvement Project Draft Environmental Impact Report/Environmental Impact Statement dated May 2012. The emissions models used in the analysis are described below.

Vehicle Emission Rates

Vehicle emission rates were determined using the California Air Resources Board's EMFAC2011 emission factor program. EMFAC2011 was made available by U.S. EPA for conformity analysis purposes on March 6, 2013.

EMFAC produces emission rates for exhaust emissions, tire wear, and brake wear. In addition to those emissions, this project is located in an area where re-entrained road dust emissions must be included. The latest U.S. EPA AP-42 analysis method for paved road dust is used; paved road dust emissions are added to emissions estimated using EMFAC to determine the total emissions from the project or any network link.

Roadway and Traffic Conditions

The hot-spot analysis was performed using peak and non-peak traffic volumes, truck volumes or percentage, and average speed for the entire project and, if identified, specific roadway links within the project were determined using traffic analysis developed for this project. Traffic data is shown in Table 4. The truck percentage is ~~3.0%~~3.5%, 3.5%, and ~~3.5%~~3.0% for the segments of SR-73 to Brookhurst, Brookhurst to SR-22 East, and SR-22 East to I-605, respectively.

Additional traffic data including vehicle speeds and LOS tables are included in Appendix B. [In summary, the VMT weighted average speeds for the 2020 No Build and Build Alternatives are 37 and 57 miles per hour, respectively. The average speeds for the 2040 No Build and Build Alternatives are 25 and 45 miles per hour, respectively.](#)

Table 4. Average Daily ~~Existing (2009)~~ and Future (2020 and 2040) Traffic Data

Scenario	Traffic Volumes					
	Northbound			Southbound		
	GP	HOV	TRUCK	GP	HOV	TRUCK
FUTURE (2020) – NO BUILD						
Morning Peak Period (6:00 AM- 9:00 AM)						
SR-73 to Brookhurst	43,461	5,550	1,576	48,090	6,712	1,744
Brookhurst to SR-22 East	34,470	6,602	1,250	30,606	6,363	1,110
SR-22 East to I-605	49,915	11,336	1,810	44,357	10,973	1,609
Subtotal by Lane	127,846	23,488	4,636	123,053	24,048	4,463
Subtotal by Time Period	307,534					
Evening Peak Period (3:00 PM - 7:00 PM)						
SR-73 to Brookhurst	65,261	8,261	2,367	58,775	7,532	2,132
Brookhurst to SR-22 East	49,762	9,448	1,805	43,842	8,427	1,590
SR-22 East to I-605	67,654	15,230	2,454	65,895	15,003	2,390
Subtotal by Lane	182,677	32,939	6,626	168,512	30,962	6,112
Subtotal by Time Period	427,828					
Non-Peak Periods						
SR-73 to Brookhurst	57,044	2,770	2,069	56,637	964	2,054
Brookhurst to SR-22 East	43,578	6,514	1,581	42,631	6,075	1,546
SR-22 East to I-605	54,968	15,879	1,994	65,039	12,534	2,359
Subtotal by Lane	155,590	25,163	5,644	164,307	19,573	5,959
Subtotal by Time Period	376,236					
Total by Lane	466,113	81,590	16,906	455,872	74,583	16,534
Total by Scenario	1,111,598					
FUTURE (2020) – ALTERNATIVE 3						
Morning Peak Period (6:00 AM - 9:00 AM)						
SR-73 to Brookhurst	40,088	8,132	1,454	49,683	8,974	1,802
Brookhurst to SR-22 East	34,697	7,572	1,258	32,037	8,413	1,162
SR-22 East to I-605	52,905	9,534	1,919	50,651	9,534	1,837
Subtotal by Lane	127,690	25,238	4,631	132,371	26,921	4,801
Subtotal by Time Period	321,652					
Evening Peak Period (3:00 PM - 7:00 PM)						
SR-73 to Brookhurst	55,690	12,021	2,020	55,874	10,894	2,027
Brookhurst to SR-22 East	45,747	11,270	1,659	43,523	11,082	1,579
SR-22 East to I-605	66,265	12,772	2,403	71,518	12,772	2,594
Subtotal by Lane	167,702	36,063	6,082	170,915	34,748	6,200
Subtotal by Time Period	421,710					
Non-Peak Periods						
SR-73 to Brookhurst	65,777	4,515	2,386	54,805	2,072	1,988
Brookhurst to SR-22 East	54,064	4,113	1,961	46,099	3,692	1,672

Scenario	Traffic Volumes					
	Northbound			Southbound		
	GP	HOV	TRUCK	GP	HOV	TRUCK
SR-22 East to I-605	72,720	4,287	2,638	68,707	4,253	2,492
Subtotal by Lane	192,561	12,915	6,985	169,611	10,017	6,152
Subtotal by Time Period	398,241					
Total by Lane	487,953	74,216	17,698	472,897	71,686	17,153
Total by Scenario	1,141,603					
FUTURE (2040) – NO BUILD						
Morning Peak Period (6:00 AM - 9:00 AM)						
SR-73 to Brookhurst	50,102	6,205	1,817	67,025	8,183	2,431
Brookhurst to SR-22 East	39,757	7,387	1,442	42,909	7,857	1,556
SR-22 East to I-605	57,692	12,921	2,092	61,637	13,668	2,236
Subtotal by Lane	147,551	26,513	5,351	171,571	29,708	6,223
Subtotal by Time Period	386,917					
Evening Peak Period (3:00 PM- 7:00 PM)						
SR-73 to Brookhurst	77,432	9,503	2,808	67,707	8,419	2,456
Brookhurst to SR-22 East	56,708	10,439	2,057	49,258	9,187	1,787
SR-22 East to I-605	79,108	17,571	2,869	74,628	16,726	2,707
Subtotal by Lane	213,248	37,513	7,734	191,593	34,332	6,950
Subtotal by Time Period	491,370					
Non-Peak Periods						
SR-73 to Brookhurst	59,164	2,902	2,146	46,624	384	1,691
Brookhurst to SR-22 East	42,764	6,781	1,551	35,425	5,850	1,285
SR-22 East to I-605	55,196	17,743	2,002	55,467	12,726	2,012
Subtotal by Lane	157,124	27,426	5,699	137,516	18,960	4,988
Subtotal by Time Period	351,713					
Total by Lane	517,923	91,452	18,784	500,680	83,000	18,161
Total by Scenario	1,230,000					
FUTURE (2040) – ALTERNATIVE 3						
Morning Peak Period (6:00 AM - 9:00 AM)						
SR-73 to Brookhurst	48,108	8,132	1,745	61,644	8,974	2,236
Brookhurst to SR-22 East	42,477	7,572	1,541	41,839	8,413	1,517
SR-22 East to I-605	63,730	9,534	2,311	63,466	9,534	2,302
Subtotal by Lane	154,315	25,238	5,597	166,949	26,921	6,055
Subtotal by Time Period	385,075					
Evening Peak Period (3:00 PM - 7:00 PM)						
SR-73 to Brookhurst	68,746	12,021	2,493	67,106	10,894	2,434
Brookhurst to SR-22 East	54,895	11,270	1,991	52,011	11,082	1,886
SR-22 East to I-605	80,390	12,772	2,916	84,264	12,772	3,056

Scenario	Traffic Volumes					
	Northbound			Southbound		
	GP	HOV	TRUCK	GP	HOV	TRUCK
Subtotal by Lane	204,031	36,063	7,400	203,381	34,748	7,376
Subtotal by Time Period	492,999					
Non-Peak Periods						
SR-73 to Brookhurst	69,275	5,266	2,513	53,137	2,349	1,927
Brookhurst to SR-22 East	54,758	4,711	1,986	44,269	4,176	1,606
SR-22 East to I-605	74,846	5,019	2,715	66,149	4,826	2,399
Subtotal by Lane	198,879	14,996	7,214	163,555	11,351	5,932
Subtotal by Time Period	401,927					
Total by Lane	557,225	76,297	20,211	533,885	73,020	19,363
Total by Scenario	1,280,001					
Alternative						
	ADT Summary			Average Speed (Miles per Hour)		
2020 No Build Total Volume	1,111,598			37		
2020 Build Total Volume	1,141,603			57		
2040 No Build Total Volume	1,230,000			25		
2040 Build Total Volume	1,280,001			45		

Scenario	Traffic Volumes					
	Northbound			Southbound		
	GP	HOV	TRUCK	GP	HOV	TRUCK
EXISTING (2009)						
Morning Peak Period (6:00 AM– 9:00 AM)						
SR-73 to Brookhurst	26,192	2,412	885	31,074	2,916	1,051
Brookhurst to SR-22 East	22,406	4,349	969	19,854	3,730	855
SR-22 East to I-605	35,278	4,347	1,437	33,763	3,421	1,349
Evening Peak Period (3:00 PM– 7:00 PM)						
SR-73 to Brookhurst	34,560	5,748	1,247	32,419	4,395	1,139
Brookhurst to SR-22 East	30,428	6,349	1,334	28,550	6,011	1,254
SR-22 East to I-605	44,102	6,236	1,826	48,422	6,123	1,978
Non-Peak Periods						
SR-73 to Brookhurst	67,777	3,015	2,189	82,682	1,092	2,591
Brookhurst to SR-22 East	62,674	5,827	2,484	69,570	3,742	2,659
SR-22 East to I-605	83,026	2,658	3,108	109,525	1,359	4,022
FUTURE (2020) — NO BUILD						
Morning Peak Period (6:00 AM– 9:00 AM)						
SR-73 to Brookhurst	32,118	5,353	1,159	40,538	6,756	1,463
Brookhurst to SR-22 East	28,402	7,100	1,288	28,473	7,118	1,291
SR-22 East to I-605	40,538	12,017	1,906	40,828	12,114	1,920

Scenario	Traffic Volumes					
	Northbound			Southbound		
	GP	HOV	TRUCK	GP	HOV	TRUCK
Evening Peak Period (3:00 PM – 7:00 PM)						
SR-73 to Brookhurst	47,597	7,933	1,717	43,672	7,279	1,576
Brookhurst to SR-22 East	40,466	10,116	1,835	36,322	9,080	1,647
SR-22 East to I-605	54,225	16,072	2,550	53,808	15,933	2,529
Non-Peak Periods						
SR-73 to Brookhurst	108,047	4,838	3,491	100,987	2,589	3,203
Brookhurst to SR-22 East	92,545	10,283	3,730	83,067	9,230	3,348
SR-22 East to I-605	120,008	22,897	5,183	123,563	18,212	5,142
FUTURE (2020) – ALTERNATIVE 3						
Morning Peak Period (6:00 AM – 9:00 AM)						
SR-73 to Brookhurst	29,338	8,132	1,159	38,320	8,974	1,463
Brookhurst to SR-22 East	27,930	7,572	1,288	27,179	8,413	1,291
SR-22 East to I-605	43,020	9,534	1,906	43,407	9,534	1,920
Evening Peak Period (3:00 PM – 7:00 PM)						
SR-73 to Brookhurst	43,509	12,021	1,717	40,056	10,894	1,576
Brookhurst to SR-22 East	39,313	11,270	1,835	34,320	11,082	1,647
SR-22 East to I-605	57,524	12,772	2,550	56,968	12,772	2,529
Non-Peak Periods						
SR-73 to Brookhurst	108,370	4,515	3,491	101,504	2,072	3,203
Brookhurst to SR-22 East	98,714	4,113	3,729	88,605	3,692	3,348
SR-22 East to I-605	138,618	4,287	5,183	137,521	4,253	5,142
FUTURE (2040) – NO BUILD						
Morning Peak Period (6:00 AM – 9:00 AM)						
SR-73 to Brookhurst	36,435	6,072	1,315	47,664	7,944	1,720
Brookhurst to SR-22 East	32,962	8,241	1,494	34,789	8,697	1,577
SR-22 East to I-605	46,769	14,094	2,207	48,862	14,792	2,309
Evening Peak Period (3:00 PM – 7:00 PM)						
SR-73 to Brookhurst	55,511	9,252	2,003	49,529	8,255	1,787
Brookhurst to SR-22 East	46,350	11,588	2,101	41,082	10,270	1,863
SR-22 East to I-605	63,221	19,070	2,985	60,857	18,282	2,870
Non-Peak Periods						
SR-73 to Brookhurst	126,013	5,642	4,072	114,530	2,937	3,633
Brookhurst to SR-22 East	106,002	11,778	4,272	93,954	10,439	3,786
SR-22 East to I-605	139,877	27,412	6,067	139,804	21,078	5,835
FUTURE (2040) – ALTERNATIVE 3						
Morning Peak Period (6:00 AM – 9:00 AM)						
SR-73 to Brookhurst	34,375	8,132	1,315	46,635	8,974	1,720
Brookhurst to SR-22 East	33,632	7,572	1,494	35,073	8,413	1,577
SR-22 East to I-605	51,329	9,534	2,207	54,119	9,534	2,309
Evening Peak Period (3:00 PM – 7:00 PM)						
SR-73 to Brookhurst	52,742	12,021	2,003	46,890	10,894	1,787

Scenario	Traffic Volumes					
	Northbound			Southbound		
	GP	HOV	TRUCK	GP	HOV	TRUCK
Brookhurst to SR-22 East	46,668	11,270	2,101	40,270	11,082	1,863
SR-22 East to I-605	69,519	12,772	2,985	66,367	12,772	2,870
Non-Peak Periods						
SR-73 to Brookhurst	126,390	5,266	4,072	115,118	2,349	3,633
Brookhurst to SR-22 East	113,069	4,711	4,272	100,217	4,176	3,786
SR-22 East to I-605	162,270	5,019	6,067	156,055	4,826	5,835

Analysis was prepared for the following scenarios:

- ~~Baseline/Existing (2009);~~
- Open-to-traffic year (2020) without project;
- Open-to-traffic year (2020) with project;
- 20-year horizon year ~~RTP horizon~~ (2040) without project, and
- 20-year horizon year ~~RTP horizon~~ (2040) with project.

Qualitative Emission Analysis

Qualitative emission analysis based on the methodology outlined in the 2006 U.S. EPA Guidance was carried out for this project. Emissions evaluated include direct exhaust emissions, tire wear, and brake wear. Paved road dust emissions were calculated and added to direct vehicle emissions. ~~NO₂ emissions were also calculated as precursors to PM_{2.5}.~~

In order to show that the project is unlikely to cause or contribute to, or worsen existing, PM hot-spots, emissions from the Build Alternative must be equal to or lower than emissions from the No Build Alternative. The emission analysis for this project demonstrates that this criterion is met (Table 5). The improvements in speeds between the same years of analysis, as discussed above, have resulted in a decrease in emissions despite the increase in volumes shown in Table 4. In addition, the project cannot move emissions significantly closer to existing sensitive receptors, and cannot cause intersection operation where a substantial number of diesel trucks are present to deteriorate below LOS D. This project also meets those criteria.

Table 5. Particulate Matter Emissions

Scenario and Emission Source	Pounds per Day	
	PM2.5	PM10
Existing/Baseline (2009)	435	1,184
No Build (2020)	522	1,550
Alternative 3 (2020)	504	1,532
Net Change from No Build to Alternative 3 (2020)	-18	-18
No Build (2040)	647	1,837
Alternative 3 (2040)	587	1,773
Net Change from No Build to Alternative 3 (2040)	-60	-64

Scenario and Emission Source	Total ADT	VMT Weighted Speed (Miles per Hour) ¹	Pounds per Day ²	
			PM2.5	PM10
No Build (2020)	1,111,600	37	280	660
Alternative 3 (2020)	1,141,600	57	268	659
Net Change from No Build to Alternative 3 (2020)	30,000	20	-12	-1
No Build (2040)	1,230,000	25	364	789
Alternative 3 (2040)	1,280,000	45	308	749
Net Change from No Build to Alternative 3 (2040)	50,000	20	-56	-41

¹The weighted average speed is calculated using the following formula:

$$VMT \text{ Weighted Average Speed} = \frac{\sum \text{Segment Length} \times ADT \times \text{Speed}}{\sum \text{Segment Length} \times ADT}$$

² Total ADTs increase by 3.2% in 2020 and 4.1% in 2040. However, the amount of PM10 and PM2.5 emissions decrease because of the increase in travel speeds. Emission rates obtained from EMFAC2011 indicate a U-shaped curve with emission factors decreasing with speed until an optimal speed is reached and emissions begin to increase. The specifics of the emissions rate curve are dependent on the vehicle type, and emission factors used for this analysis are included in Appendix E.

The proposed project will typically move mainline emissions 25 to 40 feet (7.6 to 12 meters) closer to sensitive receptors. However, there are a few areas where the widening is 60 to 80 feet (18 to 24 meters). Given the overall reduction in emissions, this is not considered to be a significant reduction in distance to sensitive receptors.

Based on this emission analysis, the Build Alternative will produce PM emissions that are lower than No Build, will not reduce LOS at (an) intersection(s) with a substantial number of trucks to D or worse, and will not move emissions significantly closer to existing sensitive receptors. Therefore, the project is unlikely to cause or contribute to, or worsen existing, violations of the PM standards.

2.3. Construction-Related Hot-Spot Emissions

40 CFR 93.123(c)(5) states that: “CO, PM10, and PM2.5 hot-spot analyses are not required to consider construction-related activities which cause temporary increases in emissions. Each site which is affected by construction-related activities shall be considered separately, using established ‘Guideline’ methods. Temporary increases are defined as those which occur only during the construction phase and last five years or less at any individual site.”

Because construction of the project is expected to last less than five years, construction-related emissions related to it are not considered in the project-level or regional conformity analysis.

Appendix A Nonattainment and Maintenance Boundary Maps

Appendix B Traffic Data

Existing Vehicle Speeds

Scenario	Speed (Miles Per Hour)			
	Northbound		Southbound	
	GP Lanes	HOV or MP Lanes	GP Lanes	HOV or MP Lanes
EXISTING/NO BUILD (2009)				
<i>Morning Peak Period (6:00 - 9:00 AM)</i>				
SR-22 East – I-605	35	55	31	51
Brookhurst Street – SR-22 East	43	53	17	47
SR-73 – Brookhurst Street	65	65	45	55
<i>Evening Peak Period (3:00 - 7:00 PM)</i>				
SR-22 East – I-605	47	55	45	55
Brookhurst Street – SR-22 East	45	55	50	60
SR-73 – Brookhurst Street	30	40	53	63
<i>Non-Peak Periods</i>				
SR-22 East – I-605	65	65	65	65
Brookhurst Street – SR-22 East	65	65	65	65
SR-73 – Brookhurst Street	65	65	65	65
OPENING YEAR (2020)				
<i>Morning Peak Period (6:00 - 9:00 AM)</i>				
SR-22 East – I-605	64	65	37	65
Brookhurst Street – SR-22 East	58	65	45	65
SR-73 – Brookhurst Street	47	65	43	65
<i>Evening Peak Period (3:00 - 7:00 PM)</i>				
SR-22 East – I-605	58	65	62	65
Brookhurst Street – SR-22 East	51	65	51	65
SR-73 – Brookhurst Street	48	65	46	65
<i>Non-Peak Periods</i>				
SR-22 East – I-605	65	65	65	65
Brookhurst Street – SR-22 East	65	65	65	65
SR-73 – Brookhurst Street	65	65	65	65
DESIGN YEAR (2040)				
<i>Morning Peak Period (6:00 - 9:00 AM)</i>				
SR-22 East – I-605	53	65	14	65
Brookhurst Street – SR-22 East	38	65	25	65
SR-73 – Brookhurst Street	22	65	14	65
<i>Evening Peak Period (3:00 - 7:00 PM)</i>				
SR-22 East – I-605	36	65	50	65
Brookhurst Street – SR-22 East	29	65	43	65
SR-73 – Brookhurst Street	22	65	24	65
<i>Non-Peak Periods</i>				
SR-22 East – I-605	65	65	65	65
Brookhurst Street – SR-22 East	65	65	65	65
SR-73 – Brookhurst Street	65	65	65	65

Mainline LOS Summary - Existing Conditions

Location	Lane Type	Direction	AM Peak Hour	PM Peak Hour
Bristol Street to Fairview Road	GP	NB	D	F
		SB	F	D
	HOV	NB	B	E
		SB	B	C
Fairview Road to Harbor Boulevard/Hyland Avenue	GP	NB	D	F
		SB	F	C
	HOV	NB	B	F
		SB	B	C
Harbor Boulevard/Hyland Avenue to Euclid Street/Ellis Avenue	GP	NB	D	F
		SB	F	D
	HOV	NB	B	E
		SB	B	C
Euclid Street/Ellis Avenue to Brookhurst Street/Talbert Avenue	GP	NB	D	F
		SB	F	D
	HOV	NB	B	E
		SB	D	D
Brookhurst Street/Talbert Avenue to Magnolia Street/Warner Avenue	GP	NB	F	F
		SB	F	F
	HOV	NB	C	F
		SB	D	C
Magnolia Street/Warner Avenue to Beach Boulevard/Edinger Avenue	GP	NB	F	F
		SB	F	F
	HOV	NB	D	C
		SB	C	D
Beach Boulevard/Edinger Street to Goldenwest Street/Bolsa Avenue	GP	NB	F	F
		SB	F	F
	HOV	NB	C	F
		SB	D	E
Goldenwest Street/Bolsa Avenue to Springdale Street/Westminster Boulevard	GP	NB	F	F
		SB	F	F
	HOV	NB	C	F
		SB	C	D
Springdale Street/Westminster Boulevard to Bolsa Chica Road/Valley View Street	GP	NB	F	F
		SB	F	F
	HOV	NB	C	F
		SB	C	D
Bolsa Chica Road/Valley View Street to Seal Beach Boulevard	GP	NB	F	F
		SB	F	F
	HOV	NB	D	F
		SB	C	D
Seal Beach Boulevard to I-605	GP	NB	F	F
		SB	F	F
	HOV	NB	C	C
		SB	D	F

Location	Lane Type	Direction	AM Peak Hour	PM Peak Hour
I-605 to San Gabriel River	GP	NB	F	C
		SB	D	F
	HOV	NB	D	D
		SB	B	E
SR-73 — Bear Street to I-405	GP	NB	B	C
		SB	B	B
I-605 — I-405 to Katella Avenue	GP	NB	C	C
		SB	F	F

Mainline LOS Summary – No Build Alternative (Year 2020)

Location	Lane Type	Direction	AM Peak Hour	PM Peak Hour
Bristol Street to Fairview Road	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
Fairview Road to Harbor Boulevard/Hyland Avenue	GP	NB	D	F
		SB	F	F
	HOV	NB	D	F
		SB	F	F
Harbor Boulevard/Hyland Avenue to Euclid Street/Ellis Avenue	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
Euclid Street/Ellis Avenue to Brookhurst Street/Talbert Avenue	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
Brookhurst Street/Talbert Avenue to Magnolia Street/Warner Avenue	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
Magnolia Street/Warner Avenue to Beach Boulevard/Edinger Avenue	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
Beach Boulevard/Edinger Street to Goldenwest Street/Bolsa Avenue	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
Goldenwest Street/Bolsa Avenue to Springdale Street/Westminster Boulevard	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F

Location	Lane Type	Direction	AM Peak Hour	PM Peak Hour
Springdale Street/Westminster Boulevard to Bolsa Chica Road/Valley View Street	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
Bolsa Chica Road/Valley View Street to Seal Beach Boulevard	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
Seal Beach Boulevard to I-605	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
I-605 to San Gabriel River	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
SR-73 — Bear Street to I-405	GP	NB	C	C
		SB	C	B
I-605 — I-405 to Katella Avenue	GP	NB	C	C
		SB	D	C

Mainline LOS Summary – No Build Alternative (Year 2040)

Location	Lane Type	Direction	AM Peak Hour	PM Peak Hour
Bristol Street to Fairview Road	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
Fairview Road to Harbor Boulevard/Hyland Avenue	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
Harbor Boulevard/Hyland Avenue to Euclid Street/Ellis Avenue	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
Euclid Street/Ellis Avenue to Brookhurst Street/Talbert Avenue	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
Brookhurst Street/Talbert Avenue to Magnolia Street/Warner Avenue	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F

Location	Lane Type	Direction	AM Peak Hour	PM Peak Hour
Magnolia Street/Warner Avenue to Beach Boulevard/Edinger Avenue	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
Beach Boulevard/Edinger Street to Goldenwest Street/Bolsa Avenue	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
Goldenwest Street/Bolsa Avenue to Springdale Street/Westminster Boulevard	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
Springdale Street/Westminster Boulevard to Bolsa Chica Road/Valley View Street	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
Bolsa Chica Road/Valley View Street to Seal Beach Boulevard	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
Seal Beach Boulevard to I-605	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
I-605 to San Gabriel River	GP	NB	F	F
		SB	F	F
	HOV	NB	F	F
		SB	F	F
SR-73 — Bear Street to I-405	GP	NB	C	C
		SB	D	C
I-605 — I-405 to Katella Avenue	GP	NB	C	F
		SB	F	D

Intersection LOS Summary – Existing Conditions

Location	AM Peak Hour	PM Peak Hour
BRISTOL STREET INTERCHANGE		
Anton/South Coast Plaza & Bristol Street	B	C
I-405 NB Off-Ramp/South Coast Plaza & Bristol Street	B	C
I-405 NB On-Ramp (for NB Bristol Street) & Bristol Street	--	--
I-405 NB On-Ramp (for SB Bristol Street) & Bristol Street	--	--
I-405 SB On-Ramp (for SB Bristol Street) & Bristol Street	--	--
I-405 SB Off-Ramp & On-Ramp (for NB Bristol Street) & Bristol Street	B	B
FAIRVIEW ROAD INTERCHANGE		
I-405 NB Ramps & Fairview Road	C	C
I-405 SB Ramps & Fairview Road	B	C
South Coast Drive & I-405 NB Off-Ramp t	C	C
HARBOR BOULEVARD & HYLAND AVENUE INTERCHANGE		
I-405 NB On-Ramp/South Coast Dr & Hyland Avenue	A	A
I-405 SB On-Ramp (for SB Harbor Boulevard) & Harbor Boulevard	--	--
I-405 NB Off-Ramp & Harbor Boulevard	B	C
I-405 NB On-Ramp (for NB Harbor Boulevard) & Harbor Boulevard	--	--
I-405 SB Off-Ramp & Harbor Boulevard	B	B
I-405 SB On-Ramp (for NB Harbor Boulevard) & Harbor Boulevard	--	--
Gisler Avenue & Harbor Boulevard	C	C
Ikea Way & Susan Street	A	A
EUCLID STREET & ELLIS AVENUE INTERCHANGE		
I-405 NB Ramps/Newhope Street & Euclid Street	C	D
Ellis Avenue I-405 SB Ramps	D	D
BROOKHURST STREET & TALBERT AVENUE INTERCHANGE		
Slater Avenue & Brookhurst Street	D	D
I-405 NB On-Ramp (for SB Brookhurst Street) & Brookhurst Street	--	--
I-405 NB Off-Ramp (to NB Brookhurst Street) & Brookhurst Street	--	--
I-405 NB Off-Ramp (to SB Brookhurst Street) & Brookhurst Street	--	--
I-405 NB On-Ramp (for NB Brookhurst Street) & Brookhurst Street	--	--
I-405 SB On-Ramp (for SB Brookhurst Street) & Brookhurst Street	--	--
I-405 SB Off-Ramp (to NB Brookhurst Street) & Brookhurst Street	--	--
I-405 SB Off-Ramp (to SB Brookhurst Street) & Brookhurst Street	--	--
Talbert Avenue & Brookhurst Street	D	D
Talbert Avenue & I-405 SB On-Ramp (for EB Talbert Avenue)	--	--
MAGNOLIA STREET & WARNER AVENUE INTERCHANGE		
Heil Avenue & Magnolia Street	C	B
I-405 NB On-Ramp (for SB Magnolia Avenue) & Magnolia Street	--	--
I-405 NB Off-Ramp (to NB Magnolia Avenue) & Magnolia Street	--	--
I-405 NB On-Ramp (for NB Magnolia Avenue) & Magnolia Street	--	--
I-405 SB On-Ramp (for SB Magnolia Avenue) & Magnolia Street	--	--
I-405 SB Off-Ramp (to NB & SB Magnolia Avenue) & Magnolia Street	A	B
Warner Avenue & Magnolia Street	D	D
Warner Avenue & I-405 SB On-Ramp (for EB Warner Avenue)	--	--
Warner Avenue & I-405 SB Off-Ramp (to EB Warner Avenue)	--	--
Warner Avenue & I-405 NB Off-Ramp (to WB Warner Avenue)	--	--
Warner Avenue & I-405 NB On-Ramp (for WB Warner Avenue)	--	--

Location	AM Peak Hour	PM Peak Hour
BEACH BOULEVARD & EDINGER AVENUE INTERCHANGE		
McFadden Avenue & Beach Boulevard	D	E
I-405 NB On-Ramp (for SB Beach Boulevard) & Beach Boulevard	--	--
I-405 NB Off-Ramp (to NB Beach Boulevard) & Beach Boulevard	--	--
I-405 NB Off-Ramp (to SB Beach Boulevard) & Beach Boulevard	--	--
I-405 NB On-Ramp (for NB Beach Boulevard) & Beach Boulevard	--	--
Center Avenue & Beach Boulevard	B	B
Center Avenue (Huntington Beach Mall) & I-405 SB Ramps	B	C
I-405 SB Off-Ramp (to NB Beach Boulevard) & Beach Boulevard	--	--
Edinger Avenue & Beach Boulevard	E	E
Edinger Avenue & I-405 SB On-Ramp	--	--
GOLDENWEST STREET & BOLSA AVENUE INTERCHANGE		
I-405 NB On-Ramp (for NB Goldenwest Street) & Goldenwest Street	--	--
Westminster Mall & I-405 SB Ramps	A	A
Westminster Mall & Goldenwest Street	A	B
Bolsa Avenue & Goldenwest Street	D	D
Bolsa Avenue & I-405 SB On-Ramp (for EB Bolsa Avenue)	--	--
Bolsa Avenue & I-405 SB Off-Ramp (to EB Bolsa Avenue)	B	B
Bolsa Avenue & I-405 NB Off-Ramp (to WB Bolsa Avenue)	--	--
SPRINGDALE STREET & WESTMINSTER BOULEVARD INTERCHANGE		
I-405 SB Off-Ramp & Springdale Street	D	E
Westminster Boulevard & Springdale Street	D	D
Westminster Boulevard & I-405 SB On-Ramp	--	--
Westminster Boulevard & I-405 SB Off-Ramp (to EB Westminster Boulevard)	--	--
Westminster Boulevard & I-405 NB Off-Ramp (to WB Westminster Boulevard)	--	--
Westminster Boulevard & I-405 NB On-Ramp	--	--
Westminster Boulevard & I-405 NB Off-Ramp/Willow Lane	B	B
BOLSA CHICA ROAD – VALLEY VIEW STREET & GARDEN GROVE BOULEVARD INTERCHANGE		
Garden Grove Boulevard & I-405 NB Off-Ramp/SR-22 EB Ramps	D	D
Garden Grove Boulevard & Bolsa Chica Rd/Valley View Street	C	F
I-405 SB On-Ramp (for SB Bolsa Chica Rd) & Bolsa Chica Rd	--	--
I-405 SB Off-Ramp (to SB Bolsa Chica Rd) & Bolsa Chica Rd	--	--
SR-22 WB/I-405 NB On-Ramp (for SB Valley View St) & Valley View Street	--	--
SR-22 WB/I-405 NB On-Ramp (for NB Valley View St) & Valley View Street	--	--
SEAL BEACH BOULEVARD INTERCHANGE		
I-405 NB Ramps & Seal Beach Boulevard	C	C
I-405 SB Ramps & Seal Beach Boulevard	D	F
BEAR STREET INTERCHANGE AT SR-73		
SR-73 NB Ramps & Bear Street	B	B
SR-73 SB Ramps & Bear Street	B	B
KATELLA AVENUE/WILLOW STREET INTERCHANGE AT I-605		
Katella Avenue & I-605 NB On-Ramp (for WB Katella Avenue)	--	--
Katella Avenue & I-605 NB On-Ramp (for EB Katella Avenue)	A	A
Katella Avenue & I-605 NB Off-Ramp (to EB Katella Avenue)	--	--
Katella Avenue & I-605 NB Off-Ramp (to WB Katella Avenue)	--	--
Katella Avenue & I-605 SB On-Ramp (for WB Katella Avenue)	--	--
Katella Avenue & I-605 SB Off-Ramp (to EB Katella Avenue)	--	--
Katella Avenue & I-605 SB On-Ramp (for EB Katella Avenue)	--	--
Willow Street & I-605 SB Off-Ramp (to WB Willow St)	--	--

Intersection LOS Summary – No Build Alternative (Year 2020)

Location	AM Peak Hour	PM Peak Hour
BRISTOL STREET INTERCHANGE		
Anton/South Coast Plaza & Bristol Street	B	D
I-405 NB Off-Ramp/South Coast Plaza & Bristol Street	--	--
I-405 NB On-Ramp (for NB Bristol Street) & Bristol Street	--	--
I-405 NB On-Ramp (for SB Bristol Street) & Bristol Street	--	--
I-405 SB On-Ramp (for SB Bristol Street) & Bristol Street	B	B
I-405 SB Off-Ramp & On-Ramp (for NB Bristol Street) & Bristol Street	B	D
FAIRVIEW ROAD INTERCHANGE		
I-405 NB Ramps & Fairview Road	F	D
I-405 SB Ramps & Fairview Road	C	C
South Coast Drive & I-405 NB Off-Ramp t	C	C
HARBOR BOULEVARD & HYLAND AVENUE INTERCHANGE		
I-405 NB On-Ramp/South Coast Dr & Hyland Avenue	A	A
I-405 SB On-Ramp (for SB Harbor Boulevard) & Harbor Boulevard	--	--
I-405 NB Off-Ramp & Harbor Boulevard	C	C
I-405 NB On-Ramp (for NB Harbor Boulevard) & Harbor Boulevard	--	--
I-405 SB Off-Ramp & Harbor Boulevard	B	B
I-405 SB On-Ramp (for NB Harbor Boulevard) & Harbor Boulevard	--	--
Gisler Avenue & Harbor Boulevard	C	D
Ikea Way & Susan Street	A	A
EUCLID STREET & ELLIS AVENUE INTERCHANGE		
I-405 NB Ramps/Newhope Street & Euclid Street	C	D
Ellis Avenue I-405 SB Ramps	F	F
BROOKHURST STREET & TALBERT AVENUE INTERCHANGE		
Slater Avenue & Brookhurst Street	F	D
I-405 NB On-Ramp (for SB Brookhurst Street) & Brookhurst Street	--	--
I-405 NB Off-Ramp (to NB Brookhurst Street) & Brookhurst Street	--	--
I-405 NB Off-Ramp (to SB Brookhurst Street) & Brookhurst Street	--	--
I-405 NB On-Ramp (for NB Brookhurst Street) & Brookhurst Street	--	--
I-405 SB On-Ramp (for SB Brookhurst Street) & Brookhurst Street	--	--
I-405 SB Off-Ramp (to NB Brookhurst Street) & Brookhurst Street	--	--
I-405 SB Off-Ramp (to SB Brookhurst Street) & Brookhurst Street	--	--
Talbert Avenue & Brookhurst Street	F	E
Talbert Avenue & I-405 SB On-Ramp (for EB Talbert Avenue)	--	--
MAGNOLIA STREET & WARNER AVENUE INTERCHANGE		
Heil Avenue & Magnolia Street	C	B
I-405 NB On-Ramp (for SB Magnolia Avenue) & Magnolia Street	--	--
I-405 NB Off-Ramp (to NB Magnolia Avenue) & Magnolia Street	--	--
I-405 NB On-Ramp (for NB Magnolia Avenue) & Magnolia Street	--	--
I-405 SB On-Ramp (for SB Magnolia Avenue) & Magnolia Street	--	--
I-405 SB Off-Ramp (to NB & SB Magnolia Avenue) & Magnolia Street	A	B
Warner Avenue & Magnolia Street	D	F
Warner Avenue & I-405 SB On-Ramp (for EB Warner Avenue)	--	--
Warner Avenue & I-405 SB Off-Ramp (to EB Warner Avenue)	--	--
Warner Avenue & I-405 NB Off-Ramp (to WB Warner Avenue)	--	--
Warner Avenue & I-405 NB On-Ramp (for WB Warner Avenue)	--	--

Location	AM Peak Hour	PM Peak Hour
BEACH BOULEVARD & EDINGER AVENUE INTERCHANGE		
McFadden Avenue & Beach Boulevard	F	F
I-405 NB On-Ramp (for SB Beach Boulevard) & Beach Boulevard	--	--
I-405 NB Off-Ramp (to NB Beach Boulevard) & Beach Boulevard	--	--
I-405 NB Off-Ramp (to SB Beach Boulevard) & Beach Boulevard	--	--
I-405 NB On-Ramp (for NB Beach Boulevard) & Beach Boulevard	--	--
Center Avenue & Beach Boulevard	B	C
Center Avenue (Huntington Beach Mall) & I-405 SB Ramps	B	C
I-405 SB Off-Ramp (to NB Beach Boulevard) & Beach Boulevard	--	--
Edinger Avenue & Beach Boulevard	F	F
Edinger Avenue & I-405 SB On-Ramp	--	--
GOLDENWEST STREET & BOLSA AVENUE INTERCHANGE		
I-405 NB On-Ramp (for NB Goldenwest Street) & Goldenwest Street	--	--
Westminster Mall & I-405 SB Ramps	A	A
Westminster Mall & Goldenwest Street	B	B
Bolsa Avenue & Goldenwest Street	D	F
Bolsa Avenue & I-405 SB On-Ramp (for EB Bolsa Avenue)	--	--
Bolsa Avenue & I-405 SB Off-Ramp (to EB Bolsa Avenue)	B	B
Bolsa Avenue & I-405 NB Off-Ramp (to WB Bolsa Avenue)	--	--
SPRINGDALE STREET & WESTMINSTER BOULEVARD INTERCHANGE		
I-405 SB Off-Ramp & Springdale Street	E	E
Westminster Boulevard & Springdale Street	D	E
Westminster Boulevard & I-405 SB On-Ramp	--	--
Westminster Boulevard & I-405 SB Off-Ramp (to EB Westminster Boulevard)	--	--
Westminster Boulevard & I-405 NB Off-Ramp (to WB Westminster Boulevard)	--	--
Westminster Boulevard & I-405 NB On-Ramp	--	--
Westminster Boulevard & I-405 NB Off-Ramp/Willow Lane	B	B
BOLSA CHICA ROAD – VALLEY VIEW STREET & GARDEN GROVE BOULEVARD INTERCHANGE		
Garden Grove Boulevard & I-405 NB Off-Ramp/SR-22 EB Ramps	E	E
Garden Grove Boulevard & Bolsa Chica Rd/Valley View Street	C	F
I-405 SB On-Ramp (for SB Bolsa Chica Rd) & Bolsa Chica Rd	--	--
I-405 SB Off-Ramp (to SB Bolsa Chica Rd) & Bolsa Chica Rd	--	--
SR-22 WB/I-405 NB On-Ramp (for SB Valley View St) & Valley View Street	--	--
SR-22 WB/I-405 NB On-Ramp (for NB Valley View St) & Valley View Street	--	--
SEAL BEACH BOULEVARD INTERCHANGE		
I-405 NB Ramps & Seal Beach Boulevard	C	C
I-405 SB Ramps & Seal Beach Boulevard	F	F
BEAR STREET INTERCHANGE AT SR-73		
SR-73 NB Ramps & Bear Street	B	B
SR-73 SB Ramps & Bear Street	B	B
KATELLA AVENUE/WILLOW STREET INTERCHANGE AT I-605		
Katella Avenue & I-605 NB On-Ramp (for WB Katella Avenue)	--	--
Katella Avenue & I-605 NB On-Ramp (for EB Katella Avenue)	A	A
Katella Avenue & I-605 NB Off-Ramp (to EB Katella Avenue)	--	--
Katella Avenue & I-605 NB Off-Ramp (to WB Katella Avenue)	--	--
Katella Avenue & I-605 SB On-Ramp (for WB Katella Avenue)	--	--
Katella Avenue & I-605 SB Off-Ramp (to EB Katella Avenue)	--	--
Katella Avenue & I-605 SB On-Ramp (for EB Katella Avenue)	--	--
Willow Street & I-605 SB Off-Ramp (to WB Willow St)	--	--

Intersection LOS Summary –Build Alternative (Year 2020)

Location	AM Peak Hour	PM Peak Hour
BRISTOL STREET INTERCHANGE		
I-405 NB Off-Ramp/South Coast Plaza & Bristol Street	B	D
I-405 NB On-Ramp (for NB Bristol Street) & Bristol Street	--	--
I-405 NB On-Ramp (for SB Bristol Street) & Bristol Street	--	--
I-405 SB On-Ramp (for SB Bristol Street) & Bristol Street	--	--
I-405 SB Off-Ramp & On-Ramp (for NB Bristol Street) & Bristol Street	B	B
FAIRVIEW ROAD INTERCHANGE		
I-405 NB Ramps & Fairview Road	F	C
I-405 SB Ramps & Fairview Road	C	C
HARBOR BOULEVARD & HYLAND AVENUE INTERCHANGE		
I-405 NB On-Ramp/South Coast Dr & Hyland Avenue	A	A
I-405 SB On-Ramp (for SB Harbor Boulevard) & Harbor Boulevard	--	--
I-405 NB Off-Ramp & Harbor Boulevard	B	C
I-405 NB On-Ramp (for NB Harbor Boulevard) & Harbor Boulevard	--	--
I-405 SB Off-Ramp & Harbor Boulevard	B	B
I-405 SB On-Ramp (for NB Harbor Boulevard) & Harbor Boulevard	--	--
Gisler Avenue & Harbor Boulevard	C	C
Ikea Way & Susan Street	A	A
EUCLID STREET & ELLIS AVENUE INTERCHANGE		
I-405 NB Ramps/Newhope Street & Euclid Street	C	D
Ellis Avenue (WBR to SB On-Ramp) & I-405 SB Ramps (I-405 SB On-Ramp is for WB Ellis Avenue)	B	B
Ellis Avenue (EBT to SB On-Ramp) & I-405 SB On-Ramp (for EB Ellis Avenue)	--	--
BROOKHURST STREET & TALBERT AVENUE INTERCHANGE		
Slater Avenue & Brookhurst Street	F	D
I-405 NB On-Ramp (for SB Brookhurst Street) & Brookhurst Street	--	--
I-405 NB Off-Ramp (to NB & SB Brookhurst Street) & Brookhurst Street	B	B
I-405 NB On-Ramp (for NB Brookhurst Street) & Brookhurst Street	--	--
I-405 SB On-Ramp (for SB Brookhurst Street) & Brookhurst Street	--	--
I-405 SB Off-Ramp (to NB & SB Brookhurst Street) & Brookhurst Street	B	B
Talbert Avenue & Brookhurst Street	F	D
Talbert Avenue & I-405 SB On-Ramp (for EB Talbert Avenue)	--	--
MAGNOLIA STREET & WARNER AVENUE INTERCHANGE		
Heil Avenue & Magnolia Street	C	B
I-405 NB On-Ramp (for SB Magnolia Avenue) & Magnolia Street	--	--
I-405 NB Off-Ramp (to NB Magnolia Avenue) & Magnolia Street	A	A
I-405 NB On-Ramp (for NB Magnolia Avenue) & Magnolia Street	--	--
I-405 SB On-Ramp (for SB Magnolia Avenue) & Magnolia Street	--	--
I-405 SB Off-Ramp (to NB & SB Magnolia Avenue) & Magnolia Street	A	B
Warner Avenue & Magnolia Street	D	D
Warner Avenue & I-405 SB On-Ramp (for EB Warner Avenue)	--	--
Warner Avenue & I-405 SB Off-Ramp (to EB Warner Avenue)	--	--
Warner Avenue & I-405 NB Off-Ramp (to WB Warner Avenue)	--	--
Warner Avenue & I-405 NB On-Ramp (for WB Warner Avenue)	--	--

Location	AM Peak Hour	PM Peak Hour
BEACH BOULEVARD & EDINGER AVENUE INTERCHANGE		
McFadden Avenue & Beach Boulevard	F	F
I-405 NB Ramps (for NB and SB Beach Boulevard) & Beach Boulevard	B	B
Center Avenue & Beach Boulevard	B	B
Center Avenue (Huntington Beach Mall) & I-405 SB Ramps	B	C
Edinger Avenue & Beach Boulevard	D	E
Edinger Avenue & I-405 SB On-Ramp	--	--
GOLDENWEST STREET & BOLSA AVENUE INTERCHANGE		
I-405 NB On-Ramp (for NB Goldenwest Street) & Goldenwest Street	--	--
Westminster Mall & I-405 SB Ramps	B	B
Westminster Mall & Goldenwest Street	A	A
Bolsa Avenue & Goldenwest Street	D	D
Bolsa Avenue & I-405 SB On-Ramp (for EB Bolsa Avenue)	--	--
Bolsa Avenue & I-405 SB Off-Ramp (to EB Bolsa Avenue)	B	B
Bolsa Avenue & I-405 NB Off-Ramp (to WB Bolsa Avenue)	--	--
Option B		
Westminster Mall & I-405 SB Ramps	--	--
SPRINGDALE STREET & WESTMINSTER BOULEVARD INTERCHANGE		
I-405 SB Off-Ramp & Springdale Street	A	A
Westminster Boulevard & Springdale Street	D	D
Westminster Boulevard & I-405 SB On-Ramp	--	--
Westminster Boulevard & I-405 SB Off-Ramp (to EB Westminster Boulevard)	--	--
Option A		
Westminster Boulevard & I-405 NB Ramps (to WB & EB Westminster Boulevard)	B	B
Westminster Boulevard & Willow Lane	C	C
Option B		
Westminster Boulevard & I-405 NB Off-Ramp (to WB Westminster Boulevard)	--	--
Westminster Boulevard & I-405 NB On-Ramp	--	--
Westminster Boulevard & I-405 NB Off-Ramp/Willow Lane	--	--
BOLSA CHICA ROAD – VALLEY VIEW STREET & GARDEN GROVE BOULEVARD INTERCHANGE		
Garden Grove Boulevard & I-405 NB Off-Ramp/SR-22 EB Ramps	D	D
Garden Grove Boulevard & Bolsa Chica Road/Valley View Street	C	C
I-405 SB Ramps (to NB & SB Bolsa Chica Road) & Bolsa Chica Road	B	A
SR-22 WB/I-405 NB On-Ramp (for SB Valley View Street) & Valley View Street	--	--
SR-22 WB/I-405 NB On-Ramp (for NB Valley View Street) & Valley View Street	--	--
SEAL BEACH BOULEVARD INTERCHANGE		
I-405 NB Ramps & Seal Beach Boulevard	C	C
I-405 SB Ramps & Seal Beach Boulevard	D	D
BEAR STREET INTERCHANGE AT SR-73		
SR-73 NB Ramps & Bear Street	B	B
SR-73 SB Ramps & Bear Street	B	B
KATELLA AVENUE/WILLOW STREET INTERCHANGE AT I-605		
Katella Avenue & I-605 NB On-Ramp (for WB Katella Avenue)	--	--
Katella Avenue & I-605 NB On-Ramp (for EB Katella Avenue)	A	A
Katella Avenue & I-605 NB Off-Ramp (to EB Katella Avenue)	--	--
Katella Avenue & I-605 NB Off-Ramp (to WB Katella Avenue)	--	--
Katella Avenue & I-605 SB On-Ramp (for WB Katella Avenue)	--	--
Katella Avenue & I-605 SB Off-Ramp (to EB Katella Avenue)	--	--
Katella Avenue & I-605 SB On-Ramp (for EB Katella Avenue)	--	--
Willow Street & I-605 SB Off-Ramp (to WB Willow Street)	--	--

Intersection LOS Summary – No Build Alternative (Year 2040)

Location	AM Peak Hour	PM Peak Hour
BRISTOL STREET INTERCHANGE		
Anton/South Coast Plaza & Bristol Street	B	D
I-405 NB Off-Ramp/South Coast Plaza & Bristol Street	C	D
I-405 NB On-Ramp (for NB Bristol Street) & Bristol Street	--	--
I-405 NB On-Ramp (for SB Bristol Street) & Bristol Street	--	--
I-405 SB On-Ramp (for SB Bristol Street) & Bristol Street	--	--
I-405 SB Off-Ramp & On-Ramp (for NB Bristol Street) & Bristol Street	B	F
FAIRVIEW ROAD INTERCHANGE		
I-405 NB Ramps & Fairview Road	F	D
I-405 SB Ramps & Fairview Road	C	C
South Coast Drive & I-405 NB Off-Ramp t	C	C
HARBOR BOULEVARD & HYLAND AVENUE INTERCHANGE		
I-405 NB On-Ramp/South Coast Drive & Hyland Avenue	A	B
I-405 SB On-Ramp (for SB Harbor Boulevard) & Harbor Boulevard	--	--
I-405 NB Off-Ramp & Harbor Boulevard	C	C
I-405 NB On-Ramp (for NB Harbor Boulevard) & Harbor Boulevard	--	--
I-405 SB Off-Ramp & Harbor Boulevard	B	B
I-405 SB On-Ramp (for NB Harbor Boulevard) & Harbor Boulevard	--	--
Gisler Avenue & Harbor Boulevard	C	E
Ikea Way & Susan Street	A	A
EUCLID STREET & ELLIS AVENUE INTERCHANGE		
I-405 NB Ramps/Newhope Street & Euclid Street	C	D
Ellis Avenue I-405 SB Ramps	F	F
BROOKHURST STREET & TALBERT AVENUE INTERCHANGE		
Slater Avenue & Brookhurst Street	F	E
I-405 NB On-Ramp (for SB Brookhurst Street) & Brookhurst Street	--	--
I-405 NB Off-Ramp (to NB Brookhurst Street) & Brookhurst Street	--	--
I-405 NB Off-Ramp (to SB Brookhurst Street) & Brookhurst Street	--	--
I-405 NB On-Ramp (for NB Brookhurst Street) & Brookhurst Street	--	--
I-405 SB On-Ramp (for SB Brookhurst Street) & Brookhurst Street	--	--
I-405 SB Off-Ramp (to NB Brookhurst Street) & Brookhurst Street	--	--
I-405 SB Off-Ramp (to SB Brookhurst Street) & Brookhurst Street	--	--
Talbert Avenue & Brookhurst Street	F	F
Talbert Avenue & I-405 SB On-Ramp (for EB Talbert Avenue)	--	--
MAGNOLIA STREET & WARNER AVENUE INTERCHANGE		
Heil Avenue & Magnolia Street	C	C
I-405 NB On-Ramp (for SB Magnolia Avenue) & Magnolia Street	--	--
I-405 NB Off-Ramp (to NB Magnolia Avenue) & Magnolia Street	--	--
I-405 NB On-Ramp (for NB Magnolia Avenue) & Magnolia Street	--	--
I-405 SB On-Ramp (for SB Magnolia Avenue) & Magnolia Street	--	--
I-405 SB Off-Ramp (to NB & SB Magnolia Avenue) & Magnolia Street	B	C
Warner Avenue & Magnolia Street	E	F
Warner Avenue & I-405 SB On-Ramp (for EB Warner Avenue)	--	--
Warner Avenue & I-405 SB Off-Ramp (to EB Warner Avenue)	--	--
Warner Avenue & I-405 NB Off-Ramp (to WB Warner Avenue)	--	--
Warner Avenue & I-405 NB On-Ramp (for WB Warner Avenue)	--	--

Location	AM Peak Hour	PM Peak Hour
BEACH BOULEVARD & EDINGER AVENUE INTERCHANGE		
McFadden Avenue & Beach Boulevard	F	F
I-405 NB On-Ramp (for SB Beach Boulevard) & Beach Boulevard	--	--
I-405 NB Off-Ramp (to NB Beach Boulevard) & Beach Boulevard	--	--
I-405 NB Off-Ramp (to SB Beach Boulevard) & Beach Boulevard	--	--
I-405 NB On-Ramp (for NB Beach Boulevard) & Beach Boulevard	--	--
Center Avenue & Beach Boulevard	B	F
Center Avenue (Huntington Beach Mall) & I-405 SB Ramps	B	D
I-405 SB Off-Ramp (to NB Beach Boulevard) & Beach Boulevard	--	--
Edinger Avenue & Beach Boulevard	F	F
Edinger Avenue & I-405 SB On-Ramp	--	--
GOLDENWEST STREET & BOLSA AVENUE INTERCHANGE		
I-405 NB On-Ramp (for NB Goldenwest Street) & Goldenwest Street	--	--
Westminster Mall & I-405 SB Ramps	A	B
Westminster Mall & Goldenwest Street	B	B
Bolsa Avenue & Goldenwest Street	D	F
Bolsa Avenue & I-405 SB On-Ramp (for EB Bolsa Avenue)	--	--
Bolsa Avenue & I-405 SB Off-Ramp (to EB Bolsa Avenue)	B	B
Bolsa Avenue & I-405 NB Off-Ramp (to WB Bolsa Avenue)	--	--
SPRINGDALE STREET & WESTMINSTER BOULEVARD INTERCHANGE		
I-405 SB Off-Ramp & Springdale Street	F	F
Westminster Boulevard & Springdale Street	D	F
Westminster Boulevard & I-405 SB On-Ramp	--	--
Westminster Boulevard & I-405 SB Off-Ramp (to EB Westminster Boulevard)	--	--
Westminster Boulevard & I-405 NB Off-Ramp (to WB Westminster Boulevard)	--	--
Westminster Boulevard & I-405 NB On-Ramp	--	--
Westminster Boulevard & I-405 NB Off-Ramp/Willow Lane	B	B
BOLSA CHICA ROAD – VALLEY VIEW STREET & GARDEN GROVE BOULEVARD INTERCHANGE		
Garden Grove Boulevard & I-405 NB Off-Ramp/SR-22 EB Ramps	E	F
Garden Grove Boulevard & Bolsa Chica Rd/Valley View Street	C	F
I-405 SB On-Ramp (for SB Bolsa Chica Rd) & Bolsa Chica Rd	--	--
I-405 SB Off-Ramp (to SB Bolsa Chica Rd) & Bolsa Chica Rd	--	--
SR-22 WB/I-405 NB On-Ramp (for SB Valley View St) & Valley View Street	--	--
SR-22 WB/I-405 NB On-Ramp (for NB Valley View St) & Valley View Street	--	--
SEAL BEACH BOULEVARD INTERCHANGE		
I-405 NB Ramps & Seal Beach Boulevard	C	D
I-405 SB Ramps & Seal Beach Boulevard	F	F
BEAR STREET INTERCHANGE AT SR-73		
SR-73 NB Ramps & Bear Street	B	B
SR-73 SB Ramps & Bear Street	B	B
KATELLA AVENUE/WILLOW STREET INTERCHANGE AT I-605		
Katella Avenue & I-605 NB On-Ramp (for WB Katella Avenue)	--	--
Katella Avenue & I-605 NB On-Ramp (for EB Katella Avenue)	A	A
Katella Avenue & I-605 NB Off-Ramp (to EB Katella Avenue)	--	--
Katella Avenue & I-605 NB Off-Ramp (to WB Katella Avenue)	--	--
Katella Avenue & I-605 SB On-Ramp (for WB Katella Avenue)	--	--
Katella Avenue & I-605 SB Off-Ramp (to EB Katella Avenue)	--	--
Katella Avenue & I-605 SB On-Ramp (for EB Katella Avenue)	--	--
Willow Street & I-605 SB Off-Ramp (to WB Willow St)	--	--

Intersection LOS Summary –Build Alternative (Year 2040)

Location	AM Peak Hour	PM Peak Hour
EUCLID STREET & ELLIS AVENUE INTERCHANGE		
I-405 NB Ramps/Newhope St & Euclid Street	C	D
Ellis Avenue (WB to SB On-Ramp) & I-405 SB Ramps (I-405 SB On-Ramp is for WB Ellis Avenue)	C	B
Ellis Avenue (EB to SB On-Ramp) & I-405 SB On-Ramp (for EB Ellis Avenue)	--	--
Ellis Avenue & Pacific Street		
BROOKHURST STREET & TALBERT AVENUE INTERCHANGE		
Slater Avenue & Brookhurst Street	F	D
I-405 NB On-Ramp (for SB Brookhurst Street) & Brookhurst Street	--	--
I-405 NB Off-Ramp (to NB & SB Brookhurst Street) & Brookhurst Street	B	B
I-405 NB On-Ramp (for NB Brookhurst Street) & Brookhurst Street	--	--
I-405 SB On-Ramp (for SB Brookhurst Street) & Brookhurst Street	--	--
I-405 SB Off-Ramp (to NB & SB Brookhurst Street) & Brookhurst Street	B	B
Talbert Avenue & Brookhurst Street	F	F
Talbert Avenue & I-405 SB On-Ramp (for EB Talbert Avenue)	--	--
MAGNOLIA STREET & WARNER AVENUE INTERCHANGE		
Heil Avenue & Magnolia Street	C	C
I-405 NB On-Ramp (for SB Magnolia Street) & Magnolia Street	--	--
I-405 NB Off-Ramp (to NB Magnolia Street) & Magnolia Street	A	A
I-405 NB On-Ramp (for NB Magnolia Street) & Magnolia Street	--	--
I-405 SB On-Ramp (for SB Magnolia Street) & Magnolia Street	--	--
I-405 SB Off-Ramp (to NB & SB Magnolia Street) & Magnolia Street	B	B
Warner Avenue & Magnolia Street	D	F
Warner Avenue & I-405 SB On-Ramp (for EB Warner Avenue)	--	--
Warner Avenue & I-405 SB Off-Ramp (to EB Warner Avenue)	--	--
Warner Avenue & I-405 NB Off-Ramp (to WB Warner Avenue)	--	--
Warner Avenue & I-405 NB On-Ramp (for WB Warner Avenue)	--	--
BEACH BOULEVARD & EDINGER AVENUE INTERCHANGE		
McFadden Avenue & Beach Boulevard	F	F
I-405 NB Ramps (for NB and SB Beach Boulevard) & Beach Boulevard	B	B
Center Avenue & Beach Boulevard	B	C
Center Avenue (Huntington Beach Mall) & I-405 SB Ramps	B	C
Edinger Avenue & Beach Boulevard	F	F
Edinger Avenue & I-405 SB On-Ramp	--	--
GOLDENWEST STREET & BOLSA AVENUE INTERCHANGE		
I-405 NB On-Ramp (for NB Goldenwest Street) & Goldenwest Street	--	--
Westminster Mall & I-405 SB Ramps	B	B
Westminster Mall & Goldenwest Street	B	A
Bolsa Avenue & Goldenwest Street	D	E
Bolsa Avenue & I-405 SB On-Ramp (for EB Bolsa Avenue)	--	--
Bolsa Avenue & I-405 SB Off-Ramp (to EB Bolsa Avenue)	B	B
Bolsa Avenue & I-405 NB Off-Ramp (to WB Bolsa Avenue)	--	--
Option B		
Westminster Mall & I-405 SB Ramps	--	--
SPRINGDALE STREET & WESTMINSTER BOULEVARD INTERCHANGE		
I-405 SB Off-Ramp & Springdale Street	A	A
Westminster Boulevard & Springdale Street	D	F
Westminster Boulevard & I-405 SB On-Ramp	--	--
Westminster Boulevard & I-405 SB Off-Ramp (to EB Westminster Boulevard)	--	--

Location	AM Peak Hour	PM Peak Hour
Option A		
Westminster Boulevard & I-405 NB Ramps (to WB & EB Westminster Boulevard)	C	B
Westminster Boulevard & Willow Lane	B	B
Option B		
Westminster Boulevard & I-405 NB Off-Ramp (to WB Westminster Boulevard)	--	--
Westminster Boulevard & I-405 NB On-Ramp	--	--
Westminster Boulevard & I-405 NB Off-Ramp/Willow Lane	--	--
BOLSA CHICA ROAD – VALLEY VIEW STREET & GARDEN GROVE BOULEVARD INTERCHANGE		
Garden Grove Boulevard & I-405 NB Off-Ramp/SR-22 EB Ramps	D	D
Garden Grove Boulevard & Bolsa Chica Road /Valley View Street	C	F
I-405 SB Ramps (to NB & SB Bolsa Chica Road) & Bolsa Chica Road	B	B
SR-22 WB/I-405 NB On-Ramp (for SB Valley View Street) & Valley View Street	--	--
SR-22 WB/I-405 NB On-Ramp (for NB Valley View Street) & Valley View Street	--	--
SEAL BEACH BOULEVARD INTERCHANGE		
I-405 NB Ramps & Seal Beach Boulevard	C	C
I-405 SB Ramps & Seal Beach Boulevard	D	F
BEAR STREET INTERCHANGE AT SR-73		
SR-73 NB Ramps & Bear Street	--	--
SR-73 SB Ramps & Bear Street	--	--
KATELLA AVENUE/WILLOW STREET INTERCHANGE AT I-605		
Katella Avenue & I-605 NB On-Ramp (for WB Katella Avenue)	--	--
Katella Avenue & I-605 NB On-Ramp (for EB Katella Avenue)	A	A
Katella Avenue & I-605 NB Off-Ramp (to EB Katella Avenue)	--	--
Katella Avenue & I-605 NB Off-Ramp (to WB Katella Avenue)	--	--
Katella Avenue & I-605 SB On-Ramp (for WB Katella Avenue)	--	--
Katella Avenue & I-605 SB Off-Ramp (to EB Katella Avenue)	--	--
Katella Avenue & I-605 SB On-Ramp (for EB Katella Avenue)	--	--
Willow Street & I-605 SB Off-Ramp (to WB Willow Street)	--	--

Appendix C EMFAC2011 Output

Appendix D CALINE4 Files

Appendix E Emission Estimates