Qualitative Particulate Matter (PM_{10} and $PM_{2.5}$) Hot Spot Assessment for Gerald Desmond Bridge Replacement Project

Ocean Boulevard from SR- 47 to the Los Angeles River
City of Long Beach, Los Angeles County

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1. INTRODUCTION

This project-level particulate matter impact assessment for the Gerald Desmond Bridge Replacement Project responds to the United States Environmental Protection Agency's (EPA) requirement for particulate matter [PM_{10} (particulate matter of diameter less than or equal to 10 microns) and $PM_{2.5}$ (particulate matter of diameter less than or equal to 2.5 microns)] hot-spot analysis, as specified in its March 10, 2006 *Final Transportation Conformity Rule* (71 FR 12468). The analysis was conducted following the procedures and methodology provided in the document *Transportation Conformity Guidance for Qualitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas* (Guidance) [*EPA, 2006a*], developed by the EPA and the Federal Highway Administration (FHWA).

This $PM_{2.5}$ and PM_{10} analysis addresses the construction of the proposed project, including the following components identified in the Regional Transportation Plan (RTP) and the Regional Transportation Improvement Program (RTIP) Amendment #44:

> *Project ID:* LA000512;
> *Description:* Ocean Boulevard, from the Los Angeles River over UPRR and Back Channel, to 0.1 mile E of State Route 47, replace existing 5 lane Gerald Desmond Bridge with new 6 lane bridge (3 lane in each direction); other improvements include construction of relocated approach structures and roads, reconstruction of existing horseshoe interchange ramp connectors, reconstruction of the existing connectors to SR-710, and reconstruction of two ramp connections to Pico Avenue.

2. PROJECT DESCRIPTION

Project Location and Purpose

The Gerald Desmond Bridge constructed in 1966 and seismically upgraded in 1995. It provides four through travel lanes (i.e., two in each direction). On the uphill segments, climbing lanes were added to accommodate container trucks and improve level of service (LOS) on the bridge. This improvement results in three ascending lanes and two descending lanes in each travel direction. Each climbing lane ends at the crest of the bridge. The bridge consists of a tied arch truss structure, in which the horizontal forces of the arch are borne by the bridge deck, rather than the ground or the bridge foundations. The bridge has a 409.5 ft-wide (124.8-m-wide) suspended span that crosses the deep-water navigable channel connecting the middle and inner harbors of the Port of Long Beach (POLB or Port).

As the fifth largest seaport complex in the world, more than 30 percent of U.S. waterborne container cargo is transported through the Ports (POLB, 2006b). The bridge is a vital link as the westerly extension of Route 710, which is the primary access route for the Ports and carries approximately 15 percent of all U.S. port-related container traffic.

The proposed project would either replace the existing functionally and seismically deficient Gerald Desmond Bridge with a new bridge that will meet the transportation needs of the Port and the region or the existing bridge would be seismically retrofitted to current standards. The bridge replacement alternatives would also include reconfiguration of adjacent arterial and freeway interchanges for consistency with the new or upgraded bridge. Bridge replacement would be completed prior to demolition of the existing bridge, to maintain traffic service. For the

rehabilitation alternative, any lane closures for deck replacement would be planned to occur during nighttime. Replacement of the existing bridge would also require relocation of the SCE transmission lines crossing Cerritos Channel north of the bridge.

The project site is located in the southwest portion of the City of Long Beach at the southern end of the Route 710 (SR-710)[1] freeway in Los Angeles County. The project corridor is in the Back Channel area of the Port, centered along Ocean Boulevard, and extends from the intersection of the Terminal Island Freeway at the western end to the easterly end of the bridge over the Los Angeles River. The southerly limit of the project is located on Pico Avenue approximately 660 feet (ft) south of the Ocean Boulevard interchange. The northerly limit of the project is along Route 710, approximately ½ mile (2,630 ft) north of Ocean Boulevard, which crosses the Back Channel over the Gerald Desmond Bridge. The Ocean Boulevard/Gerald Desmond Bridge portion of the project is located in the Port's Middle Harbor and Terminal Island Planning Districts, and the Route 710 portion is located in the Northeast Harbor Planning District. The Gerald Desmond Bridge is one of the three bridges that connect surface highways to Terminal Island in the harbor area. Figure 1 shows the project location in both a regional and local context.

The existing bridge consists of a tied arch truss structure with a 409.5-ft wide (124.8-m) suspended span (Parsons HNTB, 2002). The trusses form vertical sides to the bridge that are connected to one another by transverse beams, and by stringers and other components that support the deck. The existing vertical clearance of the main span is 156 ft (47.5 m) above mean high water line (MHWL) (local MHWL is 4.6 ft).

The project area is within a heavily urbanized portion of southern California. The immediate vicinity of the project is Port-related industrial uses. The combined ports of Long Beach and Los Angeles are the fifth largest container port in the world. The topography of the study area is flat and has been extensively modified through port and roadway development over the last 80 years.

Project Alternatives

In addition to the "no Action" alternative, two primary new alignments for the replacement alternative were studied and evaluated for the project. The location of the replacement alternative would be immediately north or south of the existing bridge. In addition, a rehabilitation alternative was also studied for the project. Based on the potential effects of the project on the environment, project benefits and after consideration of public comments on the Draft EIR/EA, the North-side Alignment Alternative was identified as the preferred alternative. A brief description of each alternative is presented below.

No Action Alternative

Under the No Action Alternative, the Gerald Desmond Bridge would not be replaced or rehabilitated. The bridge would maintain its existing deteriorated condition and would continue to provide insufficient roadway capacity to accommodate projected car and truck traffic volumes, and inadequate channel clearance for safe passage of some existing and new-generation container ships.

[1] *Highway 710 is designated by FHWA as Interstate System within the National Highway System (NHS) as high-priority corridor, in accordance with Section 1105 of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). The Route is I-710 north of Pacific Coast Highway (PCH) and SR-710, south of PCH*

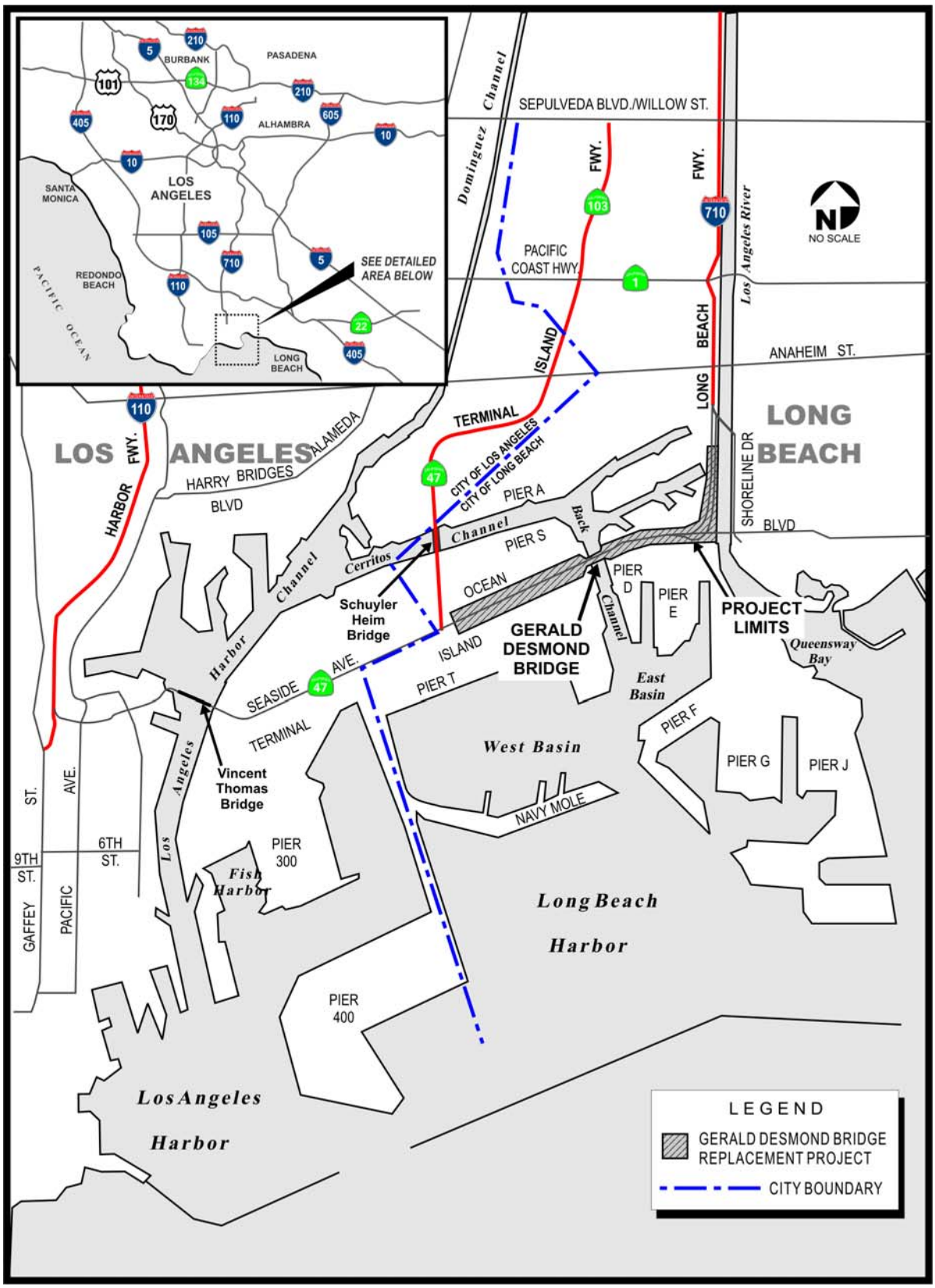


Figure 1

Gerald Desmond Bridge Replacement Project Vicinity and Project Location Map

Under this alternative the Bridge would remain the sole direct connection between Route 710, the City of Long Beach, and Terminal Island. Currently used measures to protect against failing structural elements would need to be enhanced as the bridge continues to deteriorate, and related safety issues would increase in severity. With this alternative, seismic safety of the channel crossing would not be enhanced with a new or rehabilitated bridge meeting current seismic standards. Increasing traffic volumes would result in steadily deteriorating levels of service.

North-Side Alignment Alternative

This Alternative would provide a new bridge located approximately 120 ft (37 m) north of the existing bridge (measured from centerline), and a vertical profile over the Back Channel of 200ft (61 m). This alternative alignment would provide three travel lanes in each direction along the new bridge structure, and approach grades of 5 percent in both directions. This alignment utilizes the land between the existing bridge and the Long Beach Generating Station (formerly SCE).

Approximately 3,280 ft (1,000 m) west of the channel the proposed alignment would transition to join existing Ocean Boulevard. This alternative would reconstruct all ramps for the existing Terminal Island East interchange. Approximately 3,280 ft (1,000 m) east of the channel the proposed alignment would transition to join existing Ocean Boulevard, and 2,630 ft (801 m) north of Ocean Boulevard the new connections would join existing Route 710. The four existing ramp connections to Pico Avenue would be reconstructed for this alternative (see Figure 2).

Since the new bridge would be 200 ft (61 m) above the MHWL, in contrast to the existing bridge at 156 ft (47.4 m) above MHWL, the project also requires that the SCE high voltage transmission lines, that cross the Cerritos Channel north of the bridge be either raised or relocated. The vertical clearance afforded by the existing transmission lines is approximately 153 ft (46.6 m); therefore, the SCE lines would be the primary vertical clearance hazard to navigation if the bridge clearance is increased. Relocation of the SCE lines would occur with either the North-side Alternative or the South-side Alternative (discussed below).

South-Side Alignment Alternative

The South-side Alternative would provide a new bridge located approximately 56 ft (17 m) south of the existing bridge (measured from centerline), and a vertical profile over the Back Channel of 230 ft (69 m). The approach grades would be 5 percent. Approximately 3,280 ft (1,000 m) west of the channel the proposed alignment would transition to join existing Ocean Boulevard. This alignment would require reconstruction of all ramps for the existing Terminal Island East interchange and a portion of the existing Pier T terminal main gate facility. Approximately 3,940 ft (1,200 m) east of the channel the proposed alignment would transition to join existing Ocean Boulevard, and 2,820 ft (860 m) north of Ocean Boulevard the new connections would join existing Route 710. The four existing ramp connections to Pico Avenue would have to be reconstructed for this alternative (see Figure 3).

The operations and emissions of the bridge replacement, i.e., North- and South-Side Alignment Alternatives would be the same; furthermore, the North-Sight Alternative corridor would be slightly closed to the nearest sensitive receptors, and thus, the analysis of emissions from this alternative would present a conservative localized air quality effect.

Figure 2 North-side Alignment Alternative

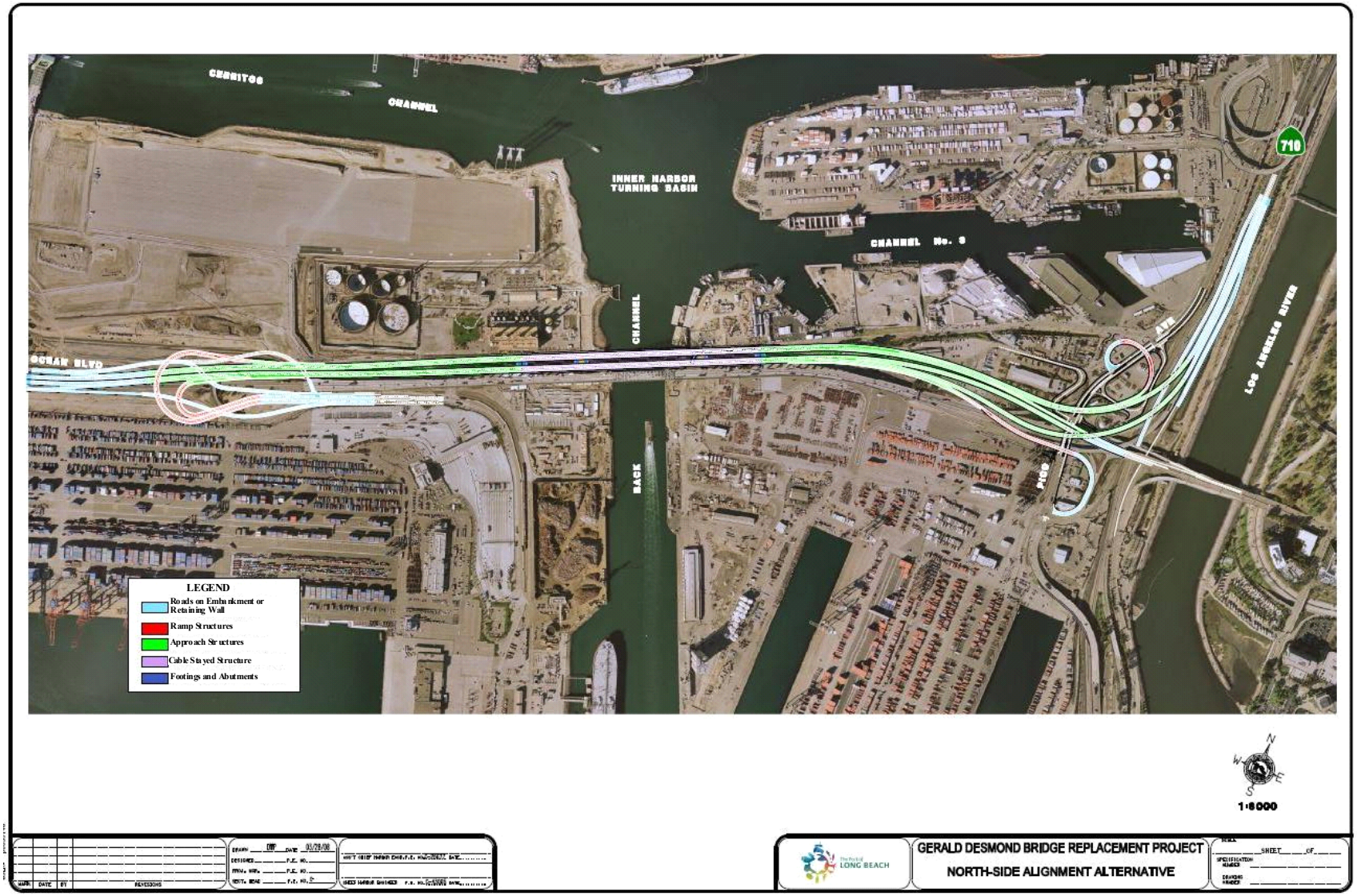
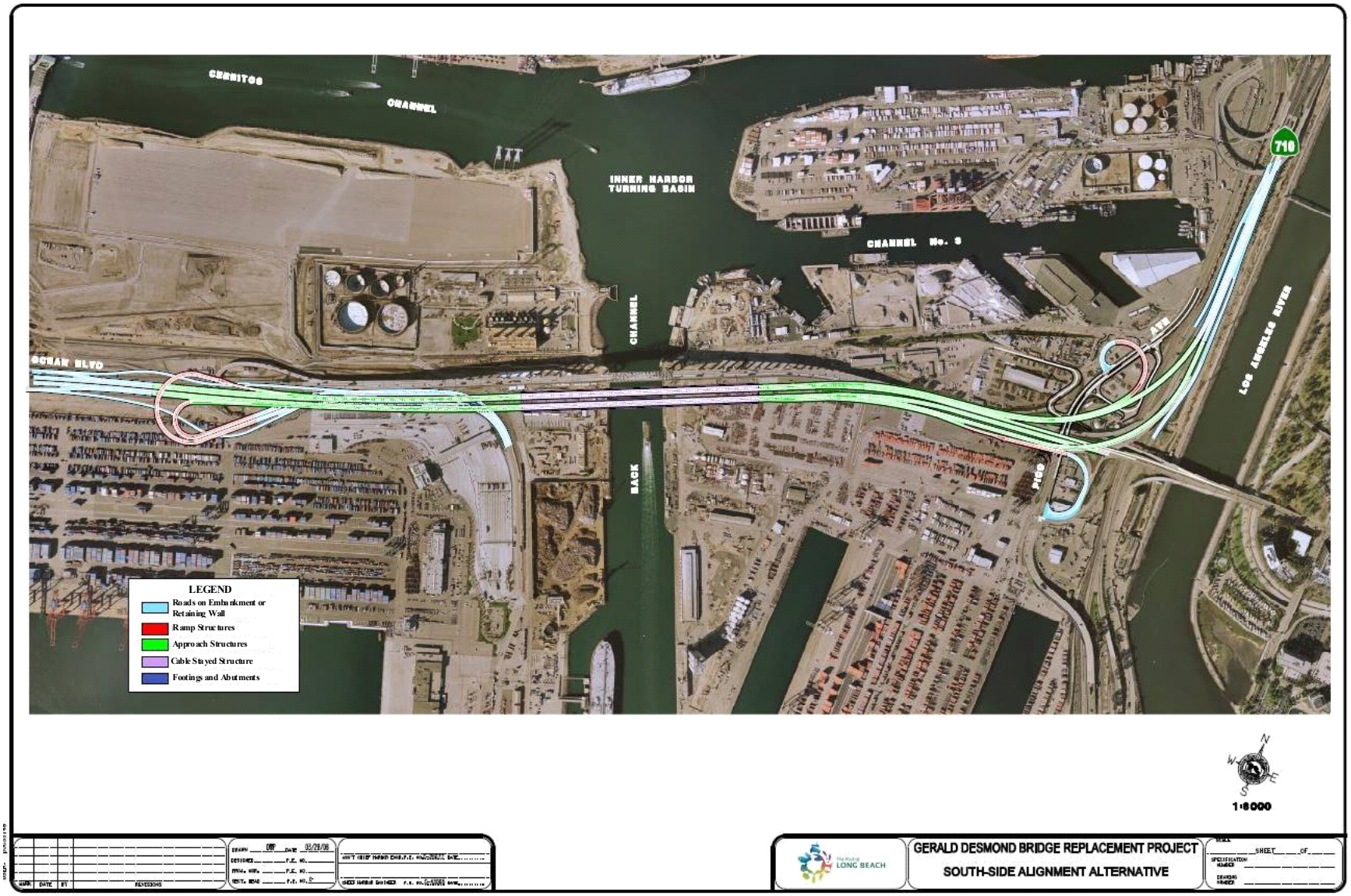


Figure 3 South-side Alignment Alternative



Rehabilitation Alternative

The existing bridge underwent a seismic retrofit study in the early 1990s, followed by a seismic retrofit to improve its seismic performance. Partial steel column casings were added at select columns to support the main steel truss span. However, to comply with current seismic detailing standards, the lap splices at the base of the columns would need to be eliminated and the amount of confinement reinforcement increased. With this alternative, the existing bridge would be rehabilitated to improve its seismic performance and to extend its operational life span. No new traffic lanes would be added, and the height of the bridge would remain at 156 ft (47.5 m) above the MHWL. To comply with current seismic detailing standards for new bridges, the lap splices at the base of the columns would need to be eliminated and the amount of confinement reinforcement increased. Because there are no practical means to accomplish this, the best solution would be to add steel casings at all columns. Lacking a detailed seismic performance study, it is assumed that the casings would be placed along the full height of the columns. These retrofit measures would allow for the level of deformation needed for the bridge to withstand a major earthquake and to comply with Caltrans SDC requirements for capacity protection of column foundations and bent caps.

Main span trussed arch members would likely require strengthening and connection retrofit to meet current requirements.

In summary, to bring the existing Gerald Desmond Bridge up to current AASHTO standards and to mitigate continuous bridge deterioration would require the following measures:

- replacement of the bridge deck;
- replacement of expansion joints;
- replacement of the sway bracings for the main span;
- painting of all steel members; and
- seismic retrofit of foundations, columns, bent caps, abutments, and superstructure.

The bridge rehabilitation activities would occur within the footprint of the existing bridge. This alternative would not require demolition of any structures on adjacent properties and would also not require any modifications to the SCE towers. The estimated cost for these corrective measures is approximately $289.3 million.

All of the above measures would be consistent with the level of retrofit undergone by major bridges in California, where retrofit measures were designed for a “No Collapse” design criteria. The “No Collapse” criteria imply that the bridge would survive the maximum credible earthquake (MCE) without collapse and loss of life, but it would have a high probability of being condemned after an extreme seismic event such as the MCE. Thus, even with implementation of the above seismic retrofit measures, the existing bridge seismic performance would not be on par with the proposed new bridge. The new bridge would be designed to withstand the MCE with only repairable damage allowed and an ability to be in service within days after the MCE event. Although seismic safety of the channel crossing would be enhanced with a rehabilitated bridge, forecasted increases in future traffic volumes would still result in steadily deteriorating levels of service.

The Rehabilitation Alternative would include retrofit activities only and would be operationally equivalent to the No Action Alternative. Operational analysis for the Rehabilitation Alternative would be the same as the No Action Alternative; thus it would not result in any operational air quality effects.

3. REGULATORY BACKGROUND

Because this project involves Federal funding and approval actions, it falls under the conformity provisions of the Federal Clean Air Act (CAA). The CAA amendments of 1990, as further amended by Federal transportation program authorizations since then, require that transportation plans, programs, and projects that are funded by or approved under Title 23 United States Code (U.S.C.) or the Federal Transit Act, conform to state or federal air quality plans for achieving NAAQS. "Conformity" is defined under section 176(c) of CAA as conforming to the purpose of the State Implementation Plan (SIP) to ensure that transportation plans, programs, and projects do not: 1) produce new air quality violations; 2) worsen existing violations; or 3) delay timely attainment of NAAQS. The CAA requirements are implemented through U.S. EPA regulations at Title 40 CFR Parts 93 and 51. Since 1997, most requirements have been in Part 93.

In determining whether a project conforms with an approved air quality plan, agencies must use current emission estimates based on the most recent population, employment, travel, and congestion estimates determined by an area's metropolitan planning organization (MPO). MPOs develop and maintain long- and short-range plans and programs, such as 20-year Regional Transportation Plans (RTP) and 4-year (or longer) Regional Transportation Improvement Programs (RTIP) that set out transportation policies and programs for the region. A regional conformity determination demonstrates that the total emissions projected for a plan or TIP are within the emissions limits (budgets) established by the SIP, and that transportation control measures (TCMs) in approved SIPs are implemented in a timely fashion to achieve the NAAQS.

In March of 2006, the Transportation Conformity Rule was revised by the EPA to provide specific "hot spot" analysis requirements for projects in PM_{10} and $PM_{2.5}$ nonattainment and maintenance areas. The EPA and the FHWA issued a guidance document for implementing this rule, *"Transportation Conformity Guidance for Qualitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} nonattainment and Maintenance Areas"*. The EPA has released draft guidance for PM10 and PM2.5 quantitative hot spot analysis, but has not yet finalized the guidance; once finalized, the guidance will replace the 2006 guidance for purposes of PM10 and PM2.5 conformity-related hot spot analysis.

Standards and Conformity Conditions

$PM_{2.5}$ nonattainment and maintenance areas are required to attain and maintain following standards:

- 24-hour standards: 35 $\mu g/m^3$ (established in 2006) and 65 $\mu g/m^3$ (established in 1997). The South Coast air basin was designated nonattainment for the 1997 standard in 2004 and for the 2006 standard in 2008. Regional emission budgets are contained in PM_{10} and $PM_{2.5}$ State Implementation Plan (SIP) revisions submitted in 2003 and 2007, respectively and are presently used as "interim" emission tests for regional conformity for the 2006 standard. A SIP revision is due to EPA by April 2013 demonstrating attainment of the 2006 PM2.5 standard by April 2015 with a possible extension to March 2020. Project-level $PM_{2.5}$ conformity is based on localized trend analysis and is applicable to both the current 24-hour

$PM_{2.5}$ standard and the previous 24-hour standard of 65 μg/m^3. Additionally, the 2008 RTP and 2008 RTIP conformity determination for $PM_{2.5}$ were based on the previous 24-hour standard of 65 μg/m^3. Therefore, $PM_{2.5}$ conformity for the proposed project is based on the 24-hour standard of 65 μg/m^3.

- Annual standard: 15.0 μg/m^3

The 24-hour $PM_{2.5}$ standard is based on 3-year average of the 98th percentile of 24-hour recorded concentrations; the annual standard is based on 3-year average of the annual arithmetic mean $PM_{2.5}$ recorded at the monitoring station. A $PM_{2.5}$ hot-spot analysis must consider both standards, unless it is determined for a given area that meeting the controlling standard would ensure that CAA requirements are met for both standards. The interagency consultation process should be used to discuss how the qualitative $PM_{2.5}$ hot-spot analysis meets statutory and regulatory requirements for both standards, depending on the factors that are evaluated for a given project.

PM_{10} nonattainment and maintenance areas are required to attain and maintain the 24-hour standard of 150 μg/m^3.

The 24-hour PM_{10} standard is attained when the average number of exceedances in the previous three calendar years is less than or equal to one. An exceedance occurs when a 24-hour average concentration of greater than 150 μg/m^3 is measured at a monitoring site. The annual PM_{10} standard of 50 μg/m^3 is no longer used for determining the federal attainment status. The interagency consultation process should be used to discuss how the qualitative PM_{10} hot-spot analysis meets statutory and regulatory requirements for PM_{10} standard, depending on the factors that are evaluated for a given project.

4. PROJECT IMPACT ANALYSIS

4.1 Project Compliance with CFR 93.116 and 93.123

Section 93.116 (a) of 40 CFR states that an FHWA/Federal Transit Authority (FTA) project must not cause or contribute to any new localized $PM_{2.5}$ violations or increase the frequency or severity of any existing PM_{10} or $PM_{2.5}$ violations in nonattainment or maintenance areas. The regulations further state that projects may satisfy this requirement without an analysis of their potential to create particulate matter hot spots, provided that they do not meet the criteria set forth in Section 93.123 (b) for "projects of air quality concern (POAQC)."

A project may be considered to have one of three types of status: (1) Exempt; (2) Not be exempt but not be a POAQC based on the specific parameters established in the regulations; and (3) It may be a POAQC, which requires that a qualitative hot-spot analysis be conducted. *The Gerald Desmond Bridge Replacement project does not meet the definition of an exempt project under Section 93.126 or 93.128.*

The 2006 Final Transportation Conformity Rule defines a POAQC that requires PM_{10} and $PM_{2.5}$ hot-spot analysis in 40 CFR 93.123(b)(1) as:

(i) New or expanded highway projects that have a significant number of or significant increase in diesel vehicles;

(ii) Projects affecting intersections that are at LOS D, E, or F with a significant number of diesel vehicles, or those that will change to LOS D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;

(iii) New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;

(iv) Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; and

(v) Projects in or affecting locations, areas, or categories of sites that are identified in the $PM_{2.5}$ and PM_{10} applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

The proposed project falls within the category of new or expanded highway projects with a significant number of diesel vehicles, and would be affecting intersections that are at LOS D, E, or F with a significant number of diesel vehicles (see Tables 3 and 4 in the following sections). The project would be considered as a POAQC based on the criteria listed in the final conformity rule (40 CFR 93.123(b)(1)). Therefore, a qualitative project-level hot-spot analysis was conducted to assess whether the project would cause or contribute to any new localized PM_{10} or $PM_{2.5}$ violations, or increase the frequency or severity of any existing violations, or delay timely attainment of the PM_{10} or $PM_{2.5}$ NAAQS.

4.2 Project-Level PM Conformity Analysis

A hot-spot analysis is defined in Section 93.101 of 40 CFR as an estimation of likely future localized pollutant concentrations and a comparison of those concentrations to the relevant air quality standards. A hot-spot analysis assesses the air quality impacts on a project-level – a scale smaller than an entire nonattainment or maintenance area, such as for congested roadway intersections and highways or transit terminals. Such an analysis is a means of demonstrating that a transportation project meets the federal CAA conformity requirements to support state and local air quality goals with respect to achieving the attainment status in a timely manner. When a hot-spot analysis is required, it is included within the project-level conformity determination that is made by FHWA or FTA.

4.3 Analysis Methodology and Types of Emissions Considered

The EPA in its *Transportation Conformity Guidance for Qualitative Hot-Spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas* (EPA 2006a) has established the following two methods for completing a $PM_{2.5}$ and PM_{10} hot-spot analysis:

a. Comparison to another location with similar characteristics – (pollutant trend within the air basin)

b. Air quality studies for the proposed project location – (ambient PM trend analysis in the project area)

This analysis uses a combined approach to demonstrate that the proposed Gerald Desmond Bridge Replacement Project would not result in a new or worsened $PM_{2.5}$ or PM_{10} violation. Method A was used to establish that the proposed project area will meet the national ambient air quality standards (NAAQS). Method B was used to demonstrate that implementation of the proposed project would not delay attainment of the NAAQS.

The proposed project is located in the South Coast Air Basin (SCAB), which is designated as nonattainment for the federal PM_{10} and $PM_{2.5}$ standards. In order to implement the hot-spot

analysis requirements of the March 10, 2006 final rule, the *Transportation Conformity Guidance for Qualitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas* (Guidance) *[EPA420-B-06-902, March 2006]* was used to perform this Qualitative Hot Spot Analysis.

The analysis was based on directly emitted $PM_{2.5}$ and PM_{10} emissions, including tailpipe, brake wear, and tire wear. Secondary particles formed through PM precursors take several hours to form in the atmosphere; thus, they would be dispersed beyond the immediate project vicinity and are not considered in a hot-spot analysis. Secondary emissions are included in the regional emission analysis prepared for the conforming RTP and TIP. Vehicles cause dust from paved and unpaved roads to be re-entrained or resuspended in the atmosphere. Re-entrained PM road dust are also included in this qualitative analysis, since the analysis addresses both PM_{10}, for which re-entrained dust must be considered, and $PM_{2.5}$ for which the California Air Resources Board (CARB) has determined that re-entrained road dust is a significant contributor to ambient PM concentrations[2].

Construction of the proposed project would last less 5 years; therefore, temporary construction emissions are not considered in this analysis as provided in 40 CFR 93.123(b)(5).

4.3 Air Quality Trend Analysis

For performing the trend analysis, PM_{10} and $PM_{2.5}$ ambient air quality data from monitoring stations within the proposed project area were utilized. This data was compared with PM_{10} and $PM_{2.5}$ NAAQS and also examined for trends to predict future conditions in the project vicinity. In the following sections, the project impacts, as well as the likelihood of these impacts interfering with the ambient $PM_{2.5}$ and PM_{10} levels to cause hot spots, are discussed. The opening year (2015), as well as the horizon year of 2030, were considered for the analysis.

Data Consideration

Particulate Levels in the Project Area

SCAQMD maintains a network of air quality monitoring stations located throughout the SCAB and has divided the Basin into 27 source/receptor areas (SRAs). The project is located in SRA number 4, South Coastal Los Angeles County. The nearest SCAQMD air monitoring station to the project site is the North Long Beach Monitoring Station (Station No. 072), which is located at 3648 Long Beach Boulevard, approximately 4 miles northeast of the project site.

The Ports of Long Beach (POLB) and Los Angeles (POLA), have recently initiated air monitoring studies to collect representative ambient pollutants and meteorological data within the Ports' operational region of influence (ROI). The special study programs include monitoring concentrations of PM_{10} and $PM_{2.5}$ to determine ambient levels of these pollutants within the Ports area.

The POLB air monitoring stations are located in two areas at the Port: one in the Inner Harbor area, near West Long Beach, and a second in the Outer Harbor area, near the breakwater. These monitoring stations were developed to expand upon regional air monitoring efforts conducted by the California Air Resources Board and the South Coast Air Quality Management District. The data gathered at the POLB stations are available for the period starting in September 2006 (*POLB, 2010*). These data are considered in context with the North Long Beach monitoring

[2] *South Coast Air Quality Management District $PM_{2.5}$ SIP, submitted to EPA by ARB; "baseline" emission budgets based on SIP including re-entrained road dust found adequate by U.S. EPA effective 5/30/2008*

station for comparison purposes, and to ensure the use of representative ambient data. However, it should be noted that according to the POLB Website, all available monitoring data from these stations is preliminary and therefore, would not be reliable for a trend analysis. In addition, since the Ports' data do not cover a 5 or more year period, they are not suitable for analysis meeting typical SIP standards. Table 1-b presents the maximum pollutant concentrations measured at these stations for the past three years (i.e., 2007 to 2009).

For purpose of trend analysis, the recorded data at the North Long Beach Stations were used in this report, since the station include the most comprehensive monitoring in the local area. The recorded recent data available from this station include data for the years 2001 to 2008. Table 1-a and Figure 4 show the particulate concentrations and their historical trend (both PM_{10} and $PM_{2.5}$), as recorded at this Monitoring Station. Table 1 provides the measured concentrations and the number of days that the applicable NAAQS was exceeded. Figure 4 includes normalized concentrations and shows the trend of the pollutant changes in the area. Normalized concentrations represent the ratio of the highest measured concentrations in a given year to the applicable national standard. Therefore, normalized concentrations lower than one indicate that the measured concentrations were lower than the ambient air quality standard. The monitored data show the following trends:

- **Respirable Particulate Matter (PM_{10})** – During the recorded period of 2001 to 2008, the 24-hour maximum monitored data were well below the NAAQS. It should be noted that data reported for 2007 represent the second high value. The first high value measured at the station (232 $\mu g/m^3$), is flagged as "exceptional event" and occurred on October 21, 2007 which coincides with southern California wildfires in 2007. With the exclusion of the flagged data, the highest recorded 24-hour concentration during the period of 2001 to 2008 was 91 $\mu g/m^3$, recorded in 2001. The NAAQS were not exceeded at any time during the last 8 years at this monitoring station.

- **Fine Particulate Matter ($PM_{2.5}$)** – During the recorded period of 2001 to 2008, the 24-hour 98th percentile concentration, averaged over 3 years, ranged from 49 to 41 $\mu g/m^3$. These recorded levels are below the 1997 NAAQS (between 75 percent and 63 percent of the 65 $\mu g/m^3$ standard level). The 2006 24-hour NAAQS of 35 $\mu g/m^3$ was exceeded during the reported period, but the overall declining rate is not changed. Furthermore, Table V-2-16 in the 2007 AQMP provides the projected 2015 24-hour $PM_{2.5}$ concentration at the Long Beach Station. The estimated design value range between 31.2 $\mu g/m^3$ and 41.9 $\mu g/m^3$, depending on the methodologies used to project the future background concentrations. The projected values are consistent with a declining trend of $PM_{2.5}$ ambient concentration within the project area.

  The annual mean $PM_{2.5}$ concentration exceeded the NAAQS every year except 2006 and 2008; however, the data show a declining trend. Specifically, from 2001 to 2003 the annual average concentrations show an approximate 8.5 percent reduction rate, with very little change from 2003 to 2004, and a higher reduction rate of approximately 12 percent from 2004 to 2005 (17.9 $\mu g/m^3$ to 15.9 $\mu g/m^3$) concentrations. Table V-2-15c in the 2007 AQMP with the California Air Resources Board (CARB) emission reduction plan and the SCAQMD emission reduction overlay, the annual $PM_{2.5}$ concentration at the Long Beach Station is projected to be 12.7 $\mu g/m^3$ in 2014. This concentration is below the federal annual standard of 15 $\mu g/m^3$. The data indicate a general declining trend for the ambient $PM_{2.5}$ concentrations in the project area.

Table 1-a. Ambient Particulate Matter Data Summary (North Long Beach Monitoring Station)

Pollutant	Standard (μg/m³)	Recorded Concentrations (μg/m³)							
		2001	2002	2003	2004	2005	2006	2007	2008
Respirable Particulate Matter (**PM_{10}**)	(24-Hour)								
	1st Maximum Concentration (μg/m³)	91	74	63	72	66	78	75[a]	62
	Days > NAAQS (150 μg/m³)	0	0	0	0	0	0	0	0
Fine Particulate Matter (**$PM_{2.5}$**)	(24-Hour)								
	1st Maximum Concentration (μg/m³)	73	63	115	67	54	59	83	57
	98th Percentile of 24-hr Concentration	49	47	47	46	41	50	41	50
	Days > NAAQS (65 μg/m³)	0	0	0	0	0	0	0	0
	3-year Average 98th Percentile (μg/m³)[b]	55	53	48	47	45	41	45	41
	(Annual)								
	Annual Arithmetic Mean (15 μg/m³)	**21.2**	**19.5**	**18.0**	**17.9**	**15.9**	14.1	**15.9**	14.1

[a] *The data reported for 2007 represent the second high value. The first high value measured at the station (232 μg/m³), is flagged as "exceptional event" and occurred on October 21, 2007 which coincides with southern California wildfires in 2007.*

[b] *Attainment condition for $PM_{2.5}$ is that the 3-year average of the 98th percentile of 24-hour concentrations at each monitor within an area must not exceed the standard, which was 65 μg/m³ during the reported period. The new 2-hour standard of 35 μg/m³ became effective in December of 2006. Annual exceedances are shown in bold type.*

Source: CARB, 2010.

Figure 4. Normalized Monitored PM Concentrations – 2001 to 2008
North Long Beach Monitoring Station

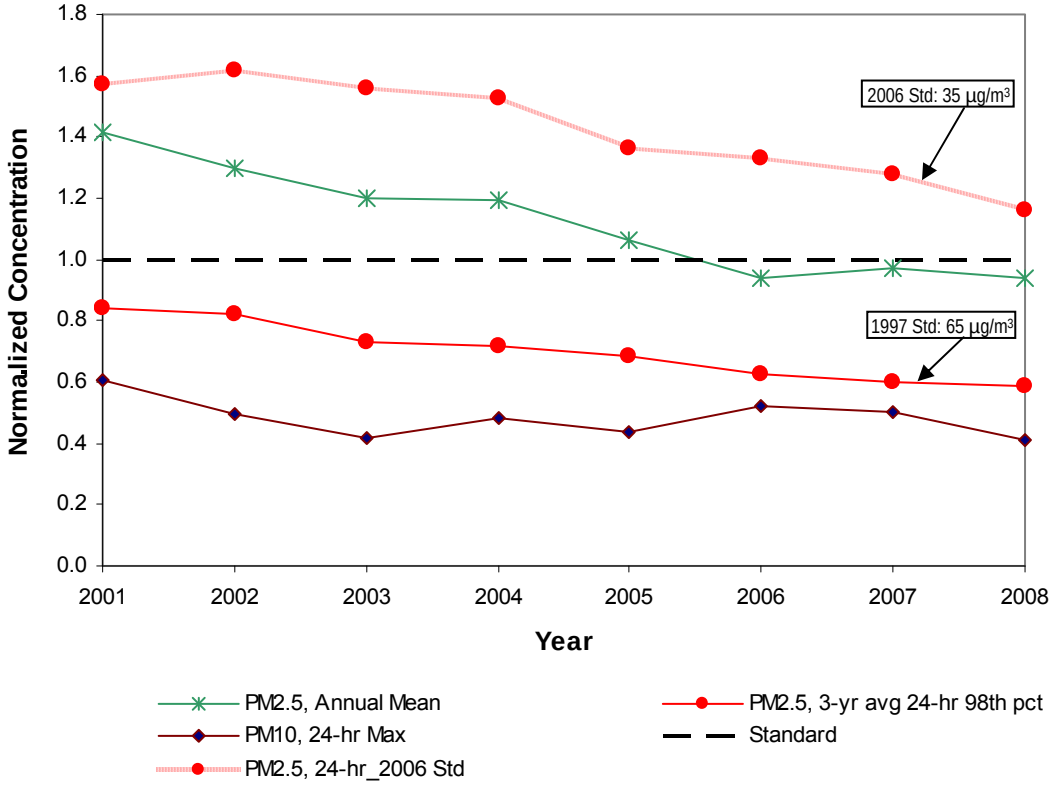


Table 1-b. Maximum PM Concentrations Measured at POLB Air Monitoring Stations from 2007 to 2009[**]

Pollutant (Concentration unit)	Averaging Period	National Standard	State Standard	Inner Port Station Data			Outer Port Station Data		
				2007	2008	2009	2007	2008	2009
PM_{10} ($\mu g/m^3$)	24-hour	150	50	**175** [a,**]	**161**	**579** [a,**]	**119** [a,**]	**133**	**201** [a,**]
$PM_{2.5}$ ($\mu g/m^3$)	24-hour	35[b]	—	60 [a,**]	56	**105** [a,**]	61 [**]	**67**	**66**

*Exceedances shown in **bold***

** *According to the POLB monitoring Website all data is preliminary (accessed July 8, 2010).*

[a] *Excludes elevated values that were recorded during wildfires.*

[b] *Based on 2004-2006 monitored data, EPA tightened the 24-hour standard of $PM_{2.5}$ from the previous level of 65$\mu g/m^3$. The updated area designation will became effective in October 2009.*

Source: POLB, 2010.

Surrounding Land Use and Future Trends

The land use surrounding the project site is mostly built out and consists primarily of industrial and Port-related uses. The climate and meteorology at the project site are typical of coastal areas, with variable winds during the day that facilitate the dispersion of pollutants better than in the inland areas. Therefore, the future air quality is expected to improve as per the trend shown in Table 1 and Figure 2 and also in the SIP. Figure 5 shows the location of nearest air quality sensitive receptors and the representative air quality monitoring station. The residential area closest to the project corridor is located on the east of Los Angeles River, approximately 0.3 mile (485 m) northeast of project's eastern boundary. Schools nearest to the project corridor include Cesar Chavez Elementary School (730 W 3rd St), and Edison Elementary School (625 Main Avenue), both located approximately 0.3 mile (485 m) east of the project site. The nearest daycare is the Childtime Learning Center (1 World Trade Center), 0.5 mile east of the project site. The nearest medical facility is the St Mary Medical Center (432 E 10th Street) approximately 1.3 mile northeast of the project eastern limit. Some residents, elementary schools and daycare centers in southeast Wilmington are also in proximity to the project site. As shown in Figure 5, the proposed replacement alignments would not move the project corridor closer to the nearest sensitive receptors.

The proposed project is included in the RTP; thus, it is included in the SCAB air quality modeling efforts for the region, as provided in the 2007 AQMP.

Basin Trends

SCAQMD's 2007 AQMP includes modeled estimates of future air quality levels within the SCAB. The modeling results that are reported in the 2007 AQMP indicate that emissions of particulate matters (PM_{10} and $PM_{2.5}$), and other criteria pollutants have decreased significantly with implementation of new air quality standards and more stringent rules and regulations. Additionally, comparisons with recent year projections show that the air quality is improving at a greater rate than what was projected by the models.

Table 2, which was derived from Chapter 10 (Looking Beyond Current Requirements) of the 2007 AQMP, provides a comparison of the monitored 2005 PM levels to the model predicted values for 2015 and 2021. As shown, the projected data indicates a trend of decreasing ambient PM concentrations from 2005 through 2021.

The monitored PM ambient concentrations at the Long Beach Station, shown in Table 1-a, support the model predicted trends, as the recorded PM_{10} and $PM_{2.5}$ levels at the monitoring station between the years 2001 and 2008 for both the 24-hour levels and average annual values show a general declining trend.

Figure 5. Sensitive Receptors and Monitoring Station Locations

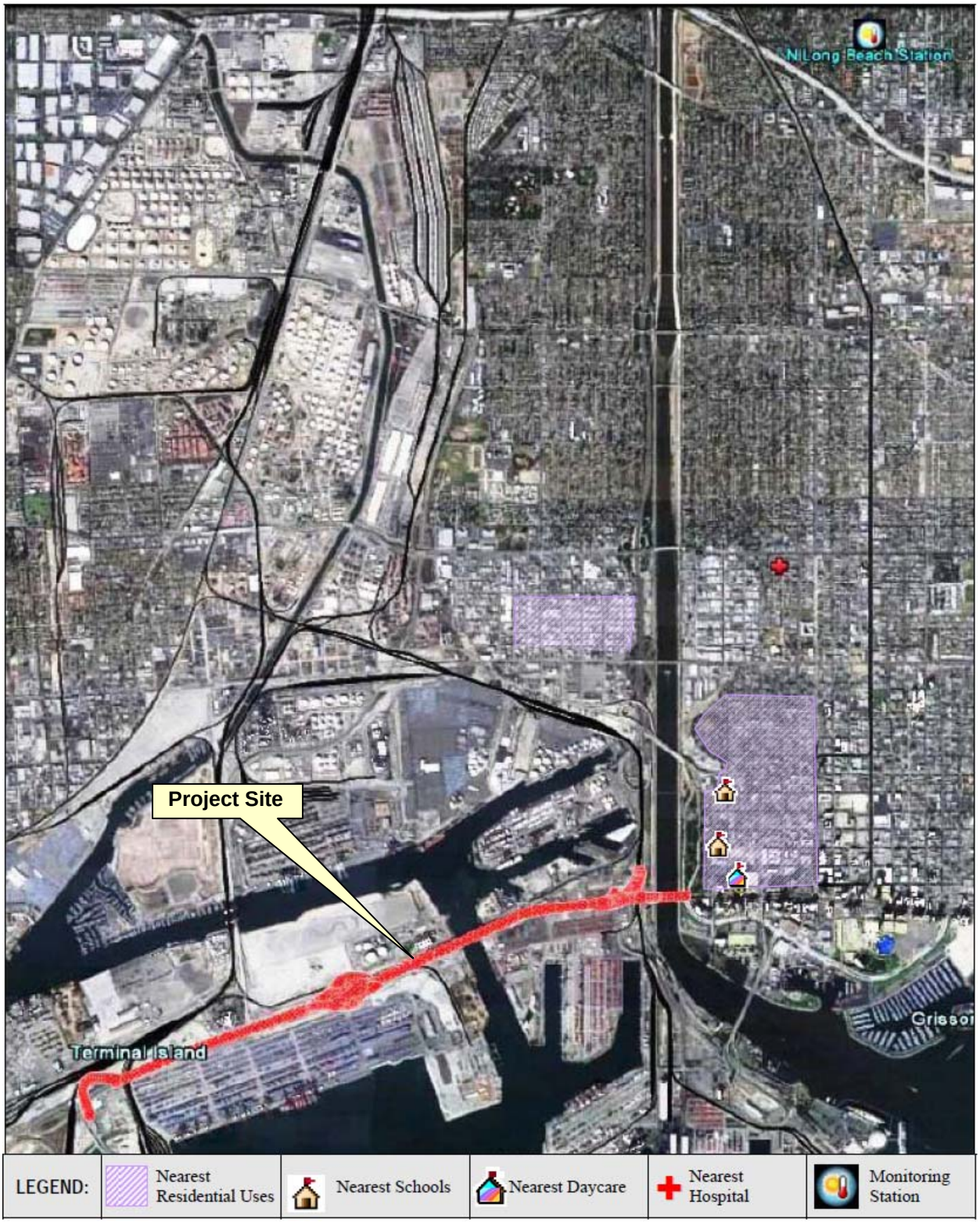


Table 2. Comparison of Particulate Matter Ambient Concentrations (SCAB)

Pollutant (Averaging Time)		Standard ($\mu g/m^3$)	2005		2015 [a]		2021 [a]	
			Observed Max Value ($\mu g/m^3$)	% Above Standard	Projected Max Value ($\mu g/m^3$)	% Above Standard	Projected Max Value ($\mu g/m^3$)	% Above Standard
PM_{10} (24-hour)		150	131	Met	117	Met	111	Met
$PM_{2.5}$ (Annual)		15.0	21.0	40	15.0	Met	<15.0	Met
$PM_{2.5}$ (24-hour)	1997 Std	65	133	104	57	Met	52	Met
	2006 Std	35	133	279	57	63	52	49

[a] *Projected data include the 2007 Control Strategies.*

Source: SCAQMD, 2007 AQMP, Chapter 10.

Project Traffic Impacts

The proposed project would replace the existing physically and functionally deficient Gerald Desmond Bridge with a new structure that would be able to carry the projected traffic volume increase in the area. In addition, the project includes the reconfiguration of freeway interchanges within the project limit and some arterial street intersections. Therefore, the project would improve traffic operations along segments of Ocean Boulevard, the Gerald Desmond Bridge, and freeway ramps and interchanges, as well as intersections within the project corridor.

Roadway Segments

The existing bridge, in each direction has two travel lanes, with a truck-climbing lane of six percent approach grade at the ascending direction up to the crest of the bridge where they merge back to the two-lane configuration. The need for the truck climbing lanes, coupled with the traffic congestion during the morning and afternoon peak operation hours, have led to a higher than statewide average accident rate on this facility. The Gerald Desmond Bridge Replacement Project would accommodate current car and truck traffic volumes and meet future needs by providing three travel lanes in each direction, thus eliminating the current merging movement, at the transition to two-lane configuration; the project would also reduce the approach grades. In addition, the project would include roadway and circulation improvements, which would reduce non-recurring congestion in the project area. Non-recurring congestion is traffic congestion related to automobile crashes, disabled vehicles, work zones, adverse weather events, and planned special events (FHWA, 2006). The addition of a 9.8 ft (3 m) outside shoulder and an 11.8 ft (3.6 m) inside shoulder at the approaches of the new bridge would provide room for emergency response vehicles, roadway maintenance personnel and disabled automobiles without causing major congestion/roadway closures to occur. These improvements in access would reduce delays in traffic thereby providing the benefit of improved air quality in the project area. Furthermore, the proposed improved 5% approach grade would help reduce emissions of pollutants from faster moving trucks in comparison to the emissions from the slower truck traffic and higher RPM trucks to climb uphill on the existing steep grade of the truck climbing lane.

Tables 3 and 4 present a comparison of average daily traffic conditions for the No Build and Build Alternatives in opening year 2015 and horizon year 2030, respectively. As shown, although the average daily traffic of Build alternative compared to the No Action condition increases along all segments of project corridor, the percent of heavy trucks are projected to

Table 3. Comparison of Roadway Segments Traffic Conditions for the No Build and Build Alternatives (Opening Year 2015)

Roadway Segment	AADT (All Vehicles)			Truck AADT and Percentage				
	No Build	Build	% AADT Change	No Build		Build		% AADT Change
				AADT	% Trucks	AADT	% Trucks	
Ocean Boulevard								
Navy Way to Pier S Avenue								
Eastbound	41,910	43,910	3.7	12,810	30.6	12,860	29.6	0.4
Westbound	37,910	38,980	2.8	11,400	30.1	11,530	29.6	1.1
Pier S Avenue to Terminal Island Freeway								
Eastbound	32,030	35,660	11.3	7,900	24.7	8,660	24.2	9.6
Westbound	30,750	32,200	4.7	5,650	18.4	5,960	18.5	5.5
Terminal Island Fwy to Horseshoe Ramps								
Eastbound	37,780	42,260	11.9	10,130	26.8	11,440	27.1	12.9
Westbound	33,700	36,690	8.9	7,380	21.9	9,170	25.0	24.3
SR-710 Connector Ramps to Downtown								
Eastbound	9,040	10,248	13.4	96	1.1	120	1.2	25.0
Westbound	12,196	12,712	4.2	2,084	17.1	2,148	16.9	3.1
Gerald Desmond Bridge								
Eastbound	40,870	46,070	12.7	12,240	29.9	14,000	30.4	14.4
Westbound	36,200	40,660	12.3	10,550	29.1	12,100	29.8	14.7
Northbound I-710 Connector Ramp	14,092	20,480	45.3	8,472	60.1	9,792	47.8	15.6
Southbound I-710 Connector Ramp	12,840	17,880	39.3	8,844	68.9	11,796	66.0	33.4

AADT – average annual daily traffic
Source: Iteris, 2009.

Table 4. Comparison of Roadway Segments Traffic Conditions for the No Build and Build Alternatives (Horizon Year 2030)

Roadway Segment	AADT (All Vehicles)			Truck AADT and Percentage				
	No Build	Build	% AADT Change	No Build		Build		% AADT Change
				AADT	% Trucks	AADT	% Trucks	
Ocean Boulevard								
Navy Way to Pier S Avenue								
Eastbound	59,540	62,410	4.8	22,020	37.0	22,220	35.6	0.9
Westbound	57,720	59,620	3.3	22,650	39.2	22,580	37.9	-0.3
Pier S Avenue to Terminal Island Freeway								
Eastbound	48,310	51,210	6	15,540	32.2	21,960	42.9	41.3
Westbound	49,230	51,820	5.3	16,730	34.0	17,470	33.7	4.4
Terminal Island Fwy to Horseshoe Ramps								
Eastbound	54,350	58,830	8.2	19,840	36.5	21,840	37.1	10.1
Westbound	56,030	58,340	4.1	21,300	38.0	19,130	32.8	-10.2
SR-710 Connector Ramps to Downtown								
Eastbound	9,912	11,824	19.3	104	1.0	116	1.0	11.5
Westbound	12,956	13,948	7.7	2,104	16.2	2,124	15.2	1
Gerald Desmond Bridge								
Eastbound	62,170	68,850	10.7	26,280	42.3	29,120	42.3	10.8
Westbound	62,500	67,080	7.3	28,080	44.9	30,610	45.6	9
Northbound I-710 Connector Ramp	18,300	21,056	15.1	9,944	54.3	12,300	58.4	23.7
Southbound I-710 Connector Ramp	14,040	19,136	36.3	10,424	74.2	14,200	74.2	36.2

AADT – average annual daily traffic
Source: Iteris, 2009.

increase along some segments and decrease along some other segments of the project corridor. Furthermore, the maximum truck ADT increase, which occurs in 2030 along the segment of Ocean Boulevard between Pier S Avenue and Terminal Island Freeway, is projected to be 7,160 which is below the 10,000 truck increase criterion for potential PM hot-spot generation.

It is worth mentioning that the bridge replacement alternatives (North- and South-Side Alignment Alternatives) would have a beneficial impact on the cumulative traffic in the project vicinity as presented in Table 5. The studied Project vicinity is the area approximately bounded by I-110 on the west, I-405 on the north, I-710 on the east, and the water on the south (Iteris, 2009). The data in Table 5 also indicate that with replacement of the Gerald Desmond Bridge, the average vehicle travel speed would slightly increase in the project vicinity area (lower daily VHT compared with the No Action conditions). These effects would translate into a decrease in vehicle emissions within the project vicinity (see Table 9).

Table 5. Forecasted Daily VMT and VHT in the Project Vicinity

Vehicle Type	No Project/ Rehabilitation Alternative	Bridge Replacement Alternatives	Increase/ (Decrease)	No Project/ Rehabilitation Alternative	Bridge Replacement Alternatives	Increase/ (Decrease)
	2015 VMT			**2030 VMT**		
Total Autos	4,475,415	4,466,876	(8,539)	4,950,124	4,937,966	(12,157)
Total Trucks	850,846	847,881	(2,964)	1,144,522	1,138,963	(5,560)
Total All Vehicles	5,326,260	5,314,757	(11,503)	6,094,646	6,076,929	(17,717)
	2015 VHT			**2030 VHT**		
Total Autos	113,604	112,817	(787)	148,869	147,273	(1,596)
Total Trucks	17,685	17,404	(281)	31,687	30,909	(778)
Total All Vehicles	131,289	130,221	(1,068)	180,556	178,182	(2,374)

Project vicinity encompasses the area approximately bounded by I-110 on the west, I-405 on the north, I-710 on the east, and the water on the south.

Source: Iteris, 2009.

Intersections

As a result of the proposed project, delays due to traffic congestion at the project intersections would be greatly reduced, and the average vehicle travel speed would slightly increase. Both of these effects would translate into a decrease in vehicle emissions. In 2030, the LOS at the intersections within the project area would be improved by implementing the Build Alternative. Tables 6 and 7 compare the peak-hour intersection conditions of the No Build Alternative to the Build Alternative for 2015 and 2030, respectively. Among the 13 intersections that were analyzed, the LOS of the Build Alternative would improve at 10 intersections compared to the No Build Alternative. As shown, at the intersection of Navy Way and Seaside Avenue, either a peak-hour LOS would decline (MD peak hour during 2015) or the LOS would be the same but the v/c ratio would increase by 2 percent or more. The intersection of Ocean Boulevard and Magnolia Avenue would be affected during morning peak hour in 2015 (increase in v/c) and during AM, mid-day, and PM peak hours in 2030 (decline in LOS) by the proposed project. The intersection of Ocean Boulevard and Golden Shore Street is projected to be affected only during PM peak hour in 2030 (LOS decline).

An emissions increase of PM would occur when the project results in a significant increase in ADT and VMT in the project area and at at locations where there are more traffic delays. Traffic delays would occur at the intersections where vehicles are accumulating and idling. It is unlikely

Table 6. Comparison of Intersection Traffic Conditions for the No-Action/Rehabilitation and Build Alternatives (Opening Year 2015)

Intersection	Peak Hour	Year 2005			Horizon Year – 2030					
		Existing or Baseline			No-Action/ Rehabilitation			Build Alternatives		
		LOS	v/c	Delay/ Vehicle	LOS	v/c	Delay/ Vehicle	LOS	v/c	Delay/ Vehicle
Terminal Island Interchange Ramps / Ocean Boulevard	AM	C	0.792	-	B	0.661	-	B	0.648	-
	MD	D	0.833	-	E	0.966	-	D	0.899	-
	PM	E	0.912	-	D	0.865	-	D	0.813	-
Pier S Avenue / Ocean Boulevard	AM	C	0.709	-	B	0.681	-	B	0.679	-
	MD	C	0.700	-	C	0.761	-	B	0.656	-
	PM	D	0.824	-	B	0.650	-	A	0.597	-
Pier S Avenue / New Dock Street	AM	A	0.327	-	A	0.328	-	A	0.352	-
	MD	A	0.350	-	A	0.420	-	A	0.432	-
	PM	A	0.356	-	A	0.337	-	A	0.337	-
Navy Way / Seaside Avenue	AM	A	0.474	-	C	0.735	-	C	0.776	-
	MD	A	0.414	-	C	0.753	-	**D**	0.768	-
	PM	A	0.581	-	E	0.914	-	E	0.935	-
Pico Avenue _Pier B Street / 9th Street	AM	A	0.428	-	B	0.606	-	A	0.594	-
	MD	A	0.455	-	A	0.594	-	B	0.613	-
	PM	A	0.494	-	A	0.575	-	A	0.588	-
Pico Avenue / Pier C Street	AM	A	0.309	-	A	0.376	-	A	0.378	-
	MD	A	0.340	-	A	0.309	-	A	0.306	-
	PM	A	0.343	-	A	0.306	-	A	0.308	-
Pico Avenue / Pier D Street	AM	B	-	10.1	C	-	23.3	A	0.492	-
	MD	B	-	11.3	C	-	19.2	A	0.432	-
	PM	B	-	10.7	C	-	15.5	A	0.399	-
Pico Avenue / Pier E Street	AM	A	-	9.9	B	-	12.4	A	0.331	-
	MD	B	-	11.8	B	-	14.0	A	0.410	-
	PM	B		11.3	C	-	18.9	A	0.582	-
Terminal Island Freeway SB Off-Ramp / New Dock Street	AM	B	-	10.8	B	-	12.2	B	-	10.8
	MD	A	-	9.1	B	-	13.3	B	-	12.1
	PM	A	-	9.3	B	-	10.5	B	-	10.3
Terminal Island Freeway NB On-Ramp / New Dock Street	AM	A	-	7.4	A	-	9.1	A	-	8.9
	MD	A	-	7.6	B	-	11.9	B	-	11.1
	PM	A	-	7.9	B	-	10.8	B	-	10.1
Pico Avenue / Broadway	AM	B	-	10.6	B	-	10.6	B	-	10.3
	MD	B	-	11.2	A	-	9.8	A	-	9.9
	PM	B	-	10.5	A	-	9.3	A	-	10.0
Ocean Boulevard/ Golden Shore Street	AM	A	0.570	-	B	0.628	-	B	0.637	-
	MD	A	0.569	-	B	0.691	-	C	0.708	-
	PM	A	0.593	-	B	0.693	-	C	0.719	-
Ocean Boulevard/ Magnolia Avenue	AM	B	0.693	-	E	0.907	-	**E**	0.929	-
	MD	A	0.575	-	C	0.741	-	C	0.785	-
	PM	B	0.601	-	C	0.771	-	C	0.765	-

*Notes: SB – southbound; NB – northbound; v/c – Vehicle to capacity ratio, presents traffic conditions for signalized intersections; Delay/Vehicle - delay per vehicle in seconds, presents traffic conditions for unsignalized intersections. LOS of intersections that are not improved by the proposed project are shown in **bold** type.*

Source: Iteris, 2009.

Table 7. Comparison of Intersection Traffic Conditions for the No-Action/Rehabilitation and Build Alternatives (Horizon Year 2030)

Intersection	Peak Hour	Year 2005 Existing or Baseline			Horizon Year – 2030 No-Action/ Rehabilitation			Horizon Year – 2030 Build Alternatives		
		LOS	v/c	Delay/ Vehicle	LOS	v/c	Delay/ Vehicle	LOS	v/c	Delay/ Vehicle
Terminal Island Interchange Ramps / Ocean Boulevard	AM	C	0.792	-	F	1.255	-	F	1.130	-
	MD	D	0.833	-	F	1.471	-	F	1.304	-
	PM	E	0.912	-	F	1.181	-	F	1.170	-
Pier S Avenue / Ocean Boulevard	AM	C	0.709	-	F	1.110	-	F	1.008	-
	MD	C	0.700	-	F	1.274	-	F	1.202	-
	PM	D	0.824	-	F	1.114	-	F	1.011	-
Pier S Avenue / New Dock Street	AM	A	0.327	-	B	0.678	-	A	0.591	-
	MD	A	0.350	-	D	0.843	-	C	0.739	-
	PM	A	0.356	-	B	0.684	-	A	0.588	-
Navy Way / Seaside Avenue	AM	A	0.474	-	E	0.904	-	**E**	0.931	-
	MD	A	0.414	-	D	0.854	-	**D**	0.875	-
	PM	A	0.581	-	F	1.091	-	**F**	1.125	-
Pico Avenue _Pier B Street / 9th Street	AM	A	0.428	-	C	0.766	-	C	0.708	-
	MD	A	0.455	-	D	0.897	-	B	0.640	-
	PM	A	0.494	-	B	0.688	-	B	0.625	-
Pico Avenue / Pier C Street	AM	A	0.309	-	A	0.442	-	A	0.446	-
	MD	A	0.340	-	A	0.385	-	A	0.381	-
	PM	A	0.343	-	A	0.402	-	A	0.402	-
Pico Avenue / Pier D Street	AM	B	-	10.1	F	-	55.1	B	0.630	-
	MD	B	-	11.3	E	-	42.0	A	0.529	-
	PM	B	-	10.7	E	-	36.8	A	0.543	-
Pico Avenue / Pier E Street	AM	A	-	9.9	C	-	18.7	A	0.465	-
	MD	B	-	11.8	C	-	23.9	A	0.559	-
	PM	B		11.3	E	-	47.6	C	0.782	
Terminal Island Freeway SB Off-Ramp / New Dock Street	AM	B	-	10.8	F	-	95.1	E	-	48.2
	MD	A	-	9.1	E	-	47.3	D	-	29.6
	PM	A	-	9.3	C	-	15.4	C	-	15.3
Terminal Island Freeway NB On-Ramp / New Dock Street	AM	A	-	7.4	C	-	15.9	B	-	13.9
	MD	A	-	7.6	D	-	30.6	C	-	22.5
	PM	A	-	7.9	D	-	32.7	C	-	21.7
Pico Avenue / Broadway	AM	B	-	10.6	B	-	11.9	B	-	11.9
	MD	B	-	11.2	B	-	10.7	B	-	11.3
	PM	B	-	10.5	B	-	10.3	B	-	11.4
Ocean Boulevard/ Golden Shore Street	AM	A	0.570	-	B	0.658	-	B	0.670	-
	MD	A	0.569	-	C	0.733	-	C	0.735	-
	PM	A	0.593	-	C	0.739	-	**D**	0.801	-
Ocean Boulevard/ Magnolia Avenue	AM	B	0.693	-	E	0.982	-	**F**	1.099	-
	MD	A	0.575	-	D	0.869	-	**E**	0.912	-
	PM	B	0.601	-	D	0.865	-	**E**	0.930	-

*Notes: SB – southbound; NB – northbound; v/c – Vehicle to capacity ratio, presents traffic conditions for signalized intersections; Delay/Vehicle - delay per vehicle in seconds, presents traffic conditions for unsignalized intersections. LOS of intersections that are not improved by the proposed project are shown in **bold** type.*

Source: Iteris, 2009.

that PM hot spots would be associated with the proposed project because local accumulation and delay of vehicles would be reduced by the project. For all intersections except three, either LOS or v/c ratio would improve with the build alternatives when compared to the No Build alternative. Potential localized PM increases associated with the increase in VMT would be offset by the increase of vehicle speed in the project area, which is an indication of reduced congestion and idling of vehicles. Thus, the project is not expected to cause an adverse effect with respect to localized concentrations of $PM_{2.5}$ or PM_{10}, at any nearby sensitive receptor.

Direct Operational Emissions from Vehicles Traffic

The primary source of air pollutants emissions generated by the proposed project would be from motor vehicles traveling within the project corridor. To determine the project direct operational impact, the roadway traffic emissions along the segments of the project corridor were estimated for the base year 2005, opening year 2015, and horizon year 2030. The peak-hour VMT data and projected average vehicle speeds along each roadway segment were provided by the project Traffic Study (Iteris, 2009). Vehicle emission factors at the average travel speeds were obtained using EMFAC2007 model (CARB, 2007a). The re-entrained road dust emission factor computed using the equation provided in the fifth edition of EPA's AP-42 document.[3] The results of particulate matter operational emissions analysis are summarized in Table 8

Although Table 8 indicates an increase of emissions from year 2015 to 2030, the emissions would likely be lower than the presented levels as a result of EPA's national control programs that are projected to reduce mobile source emissions. These control measures include retrofit measures that help reduce the future emissions, decreasing trend in background concentrations. These measures will help offset any increase in VMT-related emissions in the future years. Furthermore, the CARB has adopted a Diesel Risk Reduction Plan (DRRP) with control measures that would reduce the overall diesel PM emissions by about 85% from 2000 to 2020.

Additionally, in a joint action to improve the air quality in the SCAB, the ports of Lon Beach and Los Angeles have adopted the San Pedro Bay Ports Clean Air Action Plan (*Ports, 2006*), a comprehensive plan aimed at significantly reducing the health risks posed by air pollution from port-related ships, trains, trucks, terminal equipment and harbor craft. Under the Plan, the ports propose to eliminate "dirty" diesel trucks from San Pedro Bay cargo terminals within five years by helping to finance a new generation of clean or retrofitted vehicles.

It should be noted that as described above, the emission results are obtained using the emission factors generated from EMFAC2007 model run (with the exception of re-entrained road dust emission factors). The model was released in November of 2006 and, as such, only the control and mitigation measures that were approved by that time were incorporated in the development of the available version of the model. However, after 2007, the Port truck fleet has begun experiencing changes due to the implementation of the Ports Clean Air Action Plan (CAAP), and specifically the Port Clean Truck Program (CTP), with the goal of eliminating "dirty trucks" from the fleet and regional roadways. Specific commitments of the Port CTP were not incorporated into the project truck fleet profiles to capture these important improvements in the project build-out years 2015 and 2030.

[3] *The AP-42 emission factor assumes that road dust emissions are proportional to VMT, roadway silt loading, and average vehicle weight.*

Table 8. Summary of Project Daily PM_{10} and $PM_{2.5}$ Operational Emissions

Scenario Roadway Segment	PM_{10}			$PM_{2.5}$		
	Exhaust + Tire Wear + Brake Wear	Road Dust	Total	Exhaust + Tire Wear + Brake Wear	Road Dust	Total
Year 2015, Opening Year – No Action/Rehabilitation Alternative						
Ocean Boulevard Navy Way to Pier S Avenue	7	14	21	5	2	7
Pier S Avenue to Terminal Island Freeway	6	15	21	5	2	7
Terminal Island Freeway to Horseshoe Ramps	4	7	11	3	1	4
Gerald Desmond Bridge	16	32	48	13	4	17
NB SR 710 Connector Ramp	5	7	12	4	1	5
SB SR 710 Connector Ramp	2	4	6	2	0	2
Ocean Boulevard Connector Ramps to Downtown	1	7	8	0.5	1.5	2
Total Year 2015 – No Action/Rehabilitation	41	86	**127**	32	13	**45**
Year 2015, Opening Year – Bridge Replacement Alternatives						
Ocean Boulevard Navy Way to Pier S Avenue	6	15	21	5	2	7
Pier S Avenue to Terminal Island Freeway	7	18	25	5	3	8
Terminal Island Freeway to Horseshoe Ramps	4	6	10	3	1	4
Gerald Desmond Bridge	18	37	55	14	5	19
NB SR 710 Connector Ramp	6	8	14	4	2	6
SB SR 710 Connector Ramp	4	6	10	3	1	4
Ocean Boulevard Connector Ramps to Downtown	2	9	11	1	2	3
Total Year 2015 – Bridge Replacement Alternatives	46	101	**147**	36	15	**51**
Net Change from No Action Alternative	5	15	**20**	4	2	**6**
Horizon Year 2030 – No Action/Rehabilitation Alternative						
Ocean Boulevard Navy Way to Pier S Avenue	5	17	22	3	3	6
Pier S Avenue to Terminal Island Freeway	4	16	20	3	2	5
Terminal Island Freeway to Horseshoe Ramps	3	8	11	2	1	3
New Bridge	11	33	44	7	5	12
NB SR 710 Connector Ramp	3	8	11	2	1	3
SB SR 710 Connector Ramp	2	3	5	1	1	2
Ocean Boulevard Connector Ramps to Downtown	1	7	8	0.5	1.5	2
Total Year 2030 – No Action/Rehabilitation Alternative	28	93	**121**	19	14	**33**
Horizon Year 2030 – Bridge Replacement Alternatives						
Ocean Boulevard Navy Way to Pier S Avenue	5	18	23	3	3	6
Pier S Avenue to Terminal Island Freeway	5	19	24	4	2	6
Terminal Island Freeway to Horseshoe Ramps	2	7	9	1	2	3
Gerald Desmond Bridge	12	41	53	8	6	14
NB SR 710 Connector Ramp	4	9	13	3	1	4
SB SR 710 Connector Ramp	3	6	9	2	1	3
Ocean Boulevard Connector Ramps to Downtown	2	10	12	1	1	2
Total Year 2030 – Bridge Replacement Alternatives	33	110	**143**	22	17	**39**
Net Change from No Action Alternative	5	17	**22**	3	3	**6**

Table 8. Summary of Project Daily PM_{10} and $PM_{2.5}$ Operational Emissions

Scenario Roadway Segment	PM_{10}			$PM_{2.5}$		
	Exhaust + Tire Wear + Brake Wear	Road Dust	Total	Exhaust + Tire Wear + Brake Wear	Road Dust	Total

- *Emissions are calculated using emission factors from EMFAC2007, at the projected average speed, and VMT of each roadway segment within the study area (from Traffic Study).*
- *Estimates of directly emitted PM emissions include tailpipe, tire wear, brake wear, and the contribution from road dust emissions. The Paved Road Dust emission factor was calculated using EPA's empirical equation (AP-42):*

$$E = k \left(\frac{sL}{2}\right)^{0.65} x \left(\frac{W}{3}\right)^{1.5} x \left(1 - \frac{P}{4N}\right)$$

Where, E= particulate emission factor; k=particle size multiplier; sL=road surface silt loading; W=average weight of vehicles traveling the road (tons); P=number of days per year with >0.01 inch rain; N=days per period (365 days /year).

- *The emissions data are rounded to the nearest integer number; thus, the "total" values in table may differ 1 unit from the added numbers as presented.*
- *Calculation worksheets are provided in Attachment.*

Source: Parsons, 2010.

The proposed project would not induce development in the area, but would accommodate the projected growth and development by improving the mobility of operation of roadway network in the Port area. Table 9 presents the estimated daily emissions of PM in the project vicinity (the area approximately bounded by I-110 on the west, I-405 on the north, I-710 on the east, and the water on the south). As shown, the cumulative impact of project in the project vicinity is beneficial and improves the air quality in the project area.

Table 9. Estimated Daily PM_{10} and $PM_{2.5}$ in the Project Vicinity

Vehicle Type	No Project/ Rehabilitation Alternative	Bridge Replacement Alternatives	Increase/ (Decrease)	No Project/ Rehabilitation Alternative	Bridge Replacement Alternatives	Increase/ (Decrease)
	2015 PM_{10} Emissions (lbs/day)			2030 PM_{10} Emissions (lbs/day)		
Total Autos	3,825	3,818	(7)	4,252	4,242	(10)
Total Trucks	1,143	1,139	(4)	1,238	1,232	(6)
Total All Vehicles	4,968	4,957	(11)	5,490	5,474	(16)
	2015 $PM_{2.5}$ Emissions (lbs/day)			2030 $PM_{2.5}$ Emissions (lbs/day)		
Total Autos	670	669	(1)	763	761	(2)
Total Trucks	484	482	(2)	376	274	(2)
Total All Vehicles	1,154	1,151	(3)	1,139	1,135	(4)

Project vicinity encompasses the area approximately bounded by I-110 on the west, I-405 on the north, I-710 on the east, and the water on the south.

Indirect Operational Emissions Impacts

The existing bridge is located over the main federal navigation channel (Back Channel) that serves the Port. It provides a vertical clearance of 156 ft (47.5 m) above mean high water level (MHWL), which has proven to be insufficient for the clearance of some existing container ships, as well as new vessels currently being constructed. The Gerald Desmond Bridge is one of the lowest bridges in any large commercial port in the world. The proposed bridge would provide a higher vertical clearance of 200 ft (61 m), which would allow the passage of larger, taller vessels; as such, the

project would have potential indirect impacts on air quality by affecting the marine traffic. However, as the Port's Transportation Growth Inducement Analysis concluded, the bridge height would not cause substantial change in marine traffic of larger vessels for the following reasons.

- Given the current plans for Piers A and S, both facilities are constrained by the size of their container storage yard. That is, the berths can accommodate more cargo than the container storage yards can handle. Furthermore, Pier S would be one of the smallest container terminals in San Pedro Bay; thus, it is expected that ships in the largest category would not call at Pier S. Pier A is a better candidate for hosting the largest forecasted marine vessels.
- The Gerald Desmond Bridge height is not the only navigational constraint for Piers A and S. Most significant is the Back Channel depth under the bridge. Navigational safety concerns would require the Port to widen the channel to 315 ft (96 m) at a maximum water depth of 52 ft (16 m) at mean lower low water. However, even with these improvements, the largest ship would not be able to navigate the channel safely. Vessels would require a wider channel and deeper water, which are not considered feasible or cost effective for the foreseeable future.

Based on these results, it can be concluded that the potential growth inducement associated with the proposed project would not be significant, and it is not expected to result in considerable emissions of air pollutants. As such, the impact of indirect emissions would be less than significant and thus, was not considered for further analysis in this report.

5. CONCLUSION

The project purpose is to replace the existing physically and functionally deficient Gerald Desmond Bridge with a structurally sound and seismically resistant structure that would meet vehicular and shipping needs for its planned 100-year design life. *The proposed project improvements would also improve local traffic conditions and access to the Port area*.

Historical meteorological and climatic data indicate that the regional and local meteorological and climatic conditions have been relatively consistent within the last 30 years and likely consistency is anticipated until the horizon year of 2030. In addition, no significant changes to the current general terrain and geographic characteristics of the project area in relation to the coastal SCAB areas are anticipated.

The air quality data, recorded at the closest local monitoring station, shows a declining trend of background particulate (PM_{10} and $PM_{2.5}$) concentrations within the project area. The monitoring data indicate that the NAAQS for the 24-hour PM_{10} level and for the annual PM_{10} concentration has not been exceeded during the last seven years. For $PM_{2.5}$, the 24-hour recorded concentrations were below the previous NAAQS of 65 $\mu g/m^3$, and exceed the new standard of 35 $\mu g/m^3$, but the ambient concentration trend is declining. Similarly, the annual $PM_{2.5}$ concentration level exceeded the NAAQS up to 2005 and was below the standard since 2006. Overall, *the monitored data show an overall trend of declining background concentrations for both $PM_{2.5}$ and PM_{10} within project area (see Table 1-a and Figure 4). Based on the current trend and the adopted strategies to reduce port-wide air pollutants emissions, the ambient concentrations of PM_{10} and $PM_{2.5}$ (24-hour as well as the annual average concentrations) would likely decrease further by years 2015 and 2030*.

The proposed project would not induce development in the area, but would accommodate the projected growth and development by improving the mobility of operation of roadway network in the Port area. Total vehicle traffic and truck traffic daily VMT and VHT within the project

vicinity (the area bounded by I-110 on the west, I-405 on the north, I-710 on the east, and the water on the south) are projected to decrease with the Bridge Replacement Alternative as compared with the No Action/ Rehabilitation alternative (see Table 5), thereby, the PM emissions in the project vicinity will also decrease (see Table 9). *This indicates that although the ADT and PM emissions along the project corridor increase slightly for the proposed replacement alternatives compared with the No Action scenario, the cumulative impact of the project is beneficial within the project area, due to redirection and shortening of trips in the project vicinity*. Furthermore, as described earlier and depicted in Figure 5, the proposed replacement alternatives would not move emissions closer to the nearest sensitive receptors. An emissions increase of PM would occur when the project results in a significant increase in ADT and VMT in the project area and/or an increase in traffic congestion and delays. Based on the presented discussion, implementation of the proposed project would improve LOS, decrease delay at the project area intersections, and would increase the average vehicle speed, all of which are indication of reduced congestion and idling of vehicles. The proposed project would not result in substantial increase in diesel truck percentages in the project area. Thus the project is not expected to cause any concern with respect to localized concentrations of PM_{10} or $PM_{2.5}$.

The above discussions demonstrate that future new or worsened PM_{10} or $PM_{2.5}$ NAAQS violations are not anticipated, and therefore, the proposed project meets the conformity requirements in 40 CFR 93.123(b)(1)(i) to support state and local air quality goals with respect to potential localized air quality impacts.

6. REFERENCES

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ATTACHMENT

$PM_{2.5}$ and PM_{10} Emission Calculations

Gerald Desmond Bridge Replacement Project
Particulate Matter Emissions _ Summary calculations

Project Scenario/ Roadway Segments	PM Emissions (lbs/day)			
	PM_{10}		$PM_{2.5}$	
	Road Dust	Total	Road Dust	Total
	sL=0.02, W=2.4			
Year 2015 – No Project				
Ocean Boulevard				
Navy Way to Pier S Avenue	14	21	2	7
Pier S Avenue to Terminal Island Freeway	15	21	2	7
Terminal Island Fwy to Horseshoe Ramps	7	11	1	4
Gerald Desmond Bridge	32	48	4	17
NB I-710 Connector Ramp	7	12	1	5
SB I-710 Connector Ramp	4	6	0	2
Ocean Blvd. Connector Ramps to Downtown	7	8	2	2
Total Year 2015 – No Action	*86*	**127**	*13*	**45**
Year 2015 – With Project – Opening Year				
Ocean Boulevard				
Navy Way to Pier S Avenue	15	21	2	7
Pier S Avenue to Terminal Island Freeway	18	25	3	8
Terminal Island Fwy to Horseshoe Ramps	6	10	1	4
Gerald Desmond Bridge	37	55	5	19
NB I-710 Connector Ramp	8	14	2	6
SB I-710 Connector Ramp	6	10	1	4
Ocean Blvd. Connector Ramps to Downtown	9	11	2	3
Total Roadway Traffic Emissions	*101*	**147**	*15*	**51**
Net Change from No-Action Scenario	15	**20**	2	**6**
Horizon Year 2030 – No Project				
Ocean Boulevard				
Navy Way to Pier S Avenue	17	22	3	6
Pier S Avenue to Terminal Island Freeway	16	20	2	5
Terminal Island Fwy to Horseshoe Ramps	8	11	1	3
Gerald Desmond Bridge	33	44	5	12
NB I-710 Connector Ramp	8	11	1	3
SB I-710 Connector Ramp	3	5	1	2
Ocean Blvd. Connector Ramps to Downtown	7	8	2	2
Total Year 2030 – No Action	*93*	**121**	*14*	**33**
Horizon Year 2030 – With Project				
Ocean Boulevard				
Navy Way to Pier S Avenue	18	23	3	6
Pier S Avenue to Terminal Island Freeway	19	24	2	6
Terminal Island Fwy to Horseshoe Ramps	7	9	2	3
Gerald Desmond Bridge	41	53	6	14
NB I-710 Connector Ramp	9	13	1	4
SB I-710 Connector Ramp	6	9	1	3
Ocean Blvd. Connector Ramps to Downtown	10	12	1	2
Total Year 2030 – With Project	*110*	**143**	*17*	**39**
Net Change from No-Action Scenario	17	**22**	3	**6**

Roadway Peak Hr	Segment	Traffic Direction	Segment Length (mile)		Opening Year						Horizon Year					
					2015 - No Project			2015 with Project			2030 No Project			2030 with Project		
					Traffic Volume (vehicles/hr)		Avg Speed (mph)	Traffic Volume (vehicles/hr)		Avg Speed (mph)	Traffic Volume (vehicles/hr)		Avg Speed (mph)	Traffic Volume (vehicles/hr)		Avg Speed (mph)
			No-Action	Build	Auto	Truck		Auto	Truck		Auto	Truck		Auto	Truck	
Ocean Blvd																
AM	Navy Way to Pier S Avenue	EB	0.38	0.38	2,031	778	55	2,165	774	55	1,990	1,325	55	2,123	1,329	55
		WB	0.37	0.37	1,838	1,040	54	1,897	1,046	49	1,951	1,429	49	2,015	1,431	49
	Pier S Avenue to Terminal Island Fwy	EB	0.67	0.68	1,424	473	54	1,621	501	54	1,231	697	54	1,392	781	55
		WB	0.57	0.65	1,184	651	53	1,233	672	50	1,117	820	53	1,224	862	52
	Terminal Island Fwy to Hoseshoe ramps	EB	0.16	0.16	1,338	630	54	1,602	692	53	1,191	817	54	1,352	947	54
		WB	0.35	0.26	1,353	759	53	1,298	860	19	1,471	963	53	1,295	1,011	18
MD	Navy Way to Pier S Avenue	EB	0.38	0.38	1,472	1,246	55	1,550	1,253	55	1,452	1,669	55	1,566	1,673	55
		WB	0.37	0.37	1,070	1,117	52	1,142	1,121	50	1,146	1,560	48	1,247	1,541	50
	Pier S Avenue to Terminal Island Fwy	EB	0.67	0.68	970	589	54	1,055	719	54	934	642	54	1,073	802	56
		WB	0.57	0.65	803	553	49	858	610	52	786	751	43	829	778	51
	Terminal Island Fwy to Hoseshoe ramps	EB	0.16	0.16	1,178	848	55	1,263	964	54	1,142	910	55	1,284	1,140	55
		WB	0.35	0.26	1,061	869	14	979	921	16	1,112	1,069	12	953	1,079	15
PM	Navy Way to Pier S Avenue	EB	0.38	0.38	2,653	930	55	2,752	939	55	2,851	1,361	55	3,051	1,394	54
		WB	0.37	0.37	2,062	627	56	2,125	628	51	2,248	843	50	2,384	846	49
	Pier S Avenue to Terminal Island Fwy	EB	0.67	0.68	1,724	515	54	1,929	600	53	1,731	649	54	2,037	781	54
		WB	0.57	0.65	1,499	369	52	1,554	373	52	1,513	485	52	1,559	507	52
	Terminal Island Fwy to Hoseshoe ramps	EB	0.16	0.16	1,966	636	53	2,187	731	53	1,982	768	52	2,295	913	52
		WB	0.35	0.26	1,908	563	52	1,685	566	52	2,131	670	52	1,720	698	51
Gerald Desmond Bridge																
AM	Upgrade to Crest	EB	0.63	0.53	1,448	782	38	1,673	864	42	1,227	995	32	1,410	1,183	36
	Crest to Downgrade	EB	0.45	0.54	1,448	782	44	1,673	864	50	1,227	995	43	1,410	1,183	48
	Upgrade to Crest	WB	0.45	0.53	1,232	922	20	1,353	1,097	48	1,241	1,057	13	1,360	1,281	47
	Crest to Downgrade	WB	0.54	0.54	1,232	922	50	1,353	1,097	53	1,241	1,057	48	1,360	1,281	53
MD		EB	0.63	0.53	1,217	1,044	27	1,314	1,202	38	1,178	1,118	25	1,334	1,417	34
		EB	0.45	0.54	1,217	1,044	40	1,314	1,202	48	1,178	1,118	40	1,334	1,417	47
		WB	0.45	0.53	902	1,011	18	1,015	1,162	47	867	1,170	19	978	1,393	44
		WB	0.54	0.54	902	1,011	49	1,015	1,162	53	867	1,170	49	978	1,393	53
PM		EB	0.63	0.53	2,079	811	38	2,326	951	41	2,065	966	26	2,435	1,142	37
		EB	0.45	0.54	2,079	811	43	2,326	951	49	2,065	966	38	2,435	1,142	48
		WB	0.45	0.53	1,562	666	23	1,749	721	49	1,554	805	13	1,809	913	48
		WB	0.54	0.54	1,562	666	51	1,749	721	53	1,554	805	48	1,809	913	53
NB I-710 Connector Ramp																
AM		-	0.75	0.76	786	669	54	933	745	57	590	862	56	558	1,040	57
MD		-	0.75	0.76	834	849	55	821	980	57	731	885	56	772	1,164	58
PM		-	0.75	0.76	844	600	55	918	723	57	768	739	56	839	891	57
SB I-710 Connector Ramp																
AM		-	0.52	0.61	282	733	55	444	989	57	315	855	54	396	1,170	57
MD		-	0.52	0.61	243	553	55	359	829	56	190	699	55	287	1,066	57
PM		-	0.52	0.61	474	435	54	920	625	55	399	565	55	1,050	820	56
Ocean Blvd																
AM	NB Connector to Downtown	EB	0.63	0.83	527	0	54	591	0	53	560	0	54	742	0	53
		WB	0.46	0.63	942	103	55	1,009	108	54	1,052	97	54	1,189	111	54
MD		EB	0.63	0.83	382	3	55	471	7	54	416	6	54	481	4	54
		WB	0.46	0.63	653	324	54	727	333	55	693	342	54	809	327	54
PM		EB	0.63	0.83	1,327	21	54	1,470	23	53	1,476	20	54	1,704	25	53
		WB	0.46	0.63	933	94	54	905	96	54	968	87	54	958	93	54