Chapter 1

Project Description and Alternatives

CHAPTER 1
PROJECT DESCRIPTION AND ALTERNATIVES

1.1 INTRODUCTION

The proposed project is located in the southwest portion of Long Beach at the southern end of State Route (SR) 710 in Los Angeles County (Exhibit 1-1).

This Final Environmental Impact Report (EIR)/Environmental Assessment (EA) includes some refinements since release of the February 2010 revised Draft EIR/EA, as required, to provide updated information and/or supplemental analysis presented in the draft document as a result of considering public comments received during circulation of the revised Draft EIR/EA. No new impacts have been identified within this Final EIR/EA, the severity of the impacts identified in the revised Draft EIR/EA remain as they were previously described, and no feasible alternatives or mitigation measures have been identified that would clearly lessen the environmental impacts of the proposed project. All comments and responses to comments are provided within Chapter 4 of this Final EIR/EA.

Based on the project-specific impacts described in the revised Draft EIR/EA for the proposed Gerald Desmond Bridge Replacement Project (project) and after consideration of the public comments and associated refinements, the Port of Long Beach (Port pr POLB) and California Department of Transportation (Caltrans) have identified the North-side Alignment Alternative as the preferred alternative.

This document has been prepared by the City of Long Beach acting by and through its Board of Harbor Commissioners (BHC) (POLB) as lead agency for the EIR and Caltrans as lead agency for the EA, in accordance with Section 6005 of the Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) of 2005 (23 United States Code [U.S.C.] 327[a][2][A]), the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 *et seq.*); the Council on Environmental Quality (CEQ) Regulations implementing NEPA (40 *Code of Federal Regulations* [CFR] 1500-1508); Federal Highway Administration (FHWA) Environmental Regulations (23 CFR 771); and the California Environmental Quality Act of 1970 (CEQA) (Public Resources Code [PRC] 21000 *et seq*. as amended) and implementing guidelines (California Code of Regulations [CCR], Title 14, Section 15000 *et seq.*).

Chapter 1 of this document presents the project objectives and the purpose and need for the proposed project, as well as discussion on the project alternatives and project history. Chapter 2 analyzes the potential effects of the project pursuant to NEPA. Chapter 3 utilizes the analysis in Chapter 2 and provides supplemental analysis, as applicable, to make a determination of significance of the potential impacts pursuant to CEQA. One of the primary differences between NEPA and CEQA is the way significance is determined. With NEPA, it is the magnitude of the impact that is evaluated, and no judgment of its individual significance is deemed important. NEPA does not require that a determination of significant impacts be stated in environmental documents. With NEPA, significance is used to determine whether an Environmental Impact Statement (EIS) or some lower level of documentation would be required. NEPA requires that an EIS be prepared when the proposed federal action (project) as a whole has the potential to "significantly affect the quality of the human environment." This determination of significance is based on context and intensity of the project and its potential effects. Based on Caltrans' consideration of the project impacts and consideration of the public comments included in this Final EIR/EA, Caltrans, as assigned by FHWA, has determined that the NEPA action does not significantly impact the environment and preparation of an EIS is not required. Caltrans will issue a Finding of No Significant Impact (FONSI) for the project in accordance with NEPA. Information supporting this determination is provided in Chapter 2.

CEQA, on the other hand, does require the lead agency to identify each "significant effect on the environment" resulting from the project and ways to mitigate each significant effect. If the project may have a significant effect on any environmental resource, then an EIR must be prepared. Each and every significant effect on the environment must be disclosed in the EIR and mitigated if feasible. In addition, the CEQA Guidelines list many mandatory findings of significance that also require preparation of an EIR. There are no types of actions under NEPA that parallel the findings of mandatory significance of CEQA. Some impacts determined significant under CEQA may not be of sufficient magnitude to be determined significant under NEPA. Based on the determination that the project may have a significant effect on environmental resources, an EIR has been prepared for the proposed project pursuant to CEQA. As described in Chapter 3, the project will result in significant impacts that can be mitigated and unavoidable and significant impacts that cannot be fully mitigated. In accordance with CEQA, the Port has prepared findings for all significant impacts identified and a Statement of Overriding Considerations for impacts that will not be mitigated below a level of significance. The Findings and Statement of Overriding Considerations will be forwarded to the BHC for consideration with a recommendation to approve the project and certifying that the project complies with CEQA.

1.1.1 Project Objectives

The objectives of the proposed project include providing a structurally sound bridge linking Terminal Island and Long Beach/SR 710 over the next hundred years, given that the existing bridge is seismically deficient and could be seriously damaged in a major earthquake. Another objective is to provide sufficient roadway capacity to handle current and projected vehicular traffic volume demand, which the existing bridge cannot provide with only two through lanes and no shoulders. Lastly, the proposed project would provide sufficient vertical clearance for safe navigation through the Back Channel to the Inner Harbor, which the existing bridge, at only 156 feet (ft) (47.5 meters [m]) above mean high water level (MHWL), does not provide. (See Section 1.1.2.2 for detailed information supporting these objectives.)

The project would replace or rehabilitate the existing seismically deficient Gerald Desmond Bridge. Additionally, the North- and South-side Alignment Alternatives would improve vehicular traffic flow and marine vessel safety. The Bridge Replacement Alternatives would provide additional benefit to the Port and region by handling existing operations and forecasted growth in vehicular traffic, vessel traffic, and goods movement. The project objectives are consistent with similar goals addressed in the Port Master Plan (PMP), as amended.

1.1.2 Purpose and Need

This project is included in the Southern California Association of Governments (SCAG) 2008 Regional Transportation Plan (RTP) and 2008 Regional Transportation Improvement Program (RTIP) for Local Highway Projects (Project ID LA000512).

The current estimated cost of the proposed North- and South-side Bridge Replacement Alternatives and the Rehabilitation Alternative is approximately $983 million, $1.0 billion, and $289.3 million (in 2008 dollars), respectively. The Port would secure funding for the project from federal, state, regional, and local agency resources, and it would continue to pursue public-private partnerships to the extent required to supplement public funds.

1.1.2.1 Project Purpose

Based on the overall project objectives in Section 1.1.1 and the specific needs and deficiencies described below, the purpose of the proposed project is four-fold – to provide a bridge that would:

1. Be structurally sound and seismically resistant;
2. Reduce approach grades;
3. Provide sufficient roadway capacity to handle current and future car and truck traffic volumes; and
4. Provide vertical clearance that would afford safe passage of existing container ships and for new-generation larger vessels currently being constructed.

Only the Bridge Replacement Alternatives would meet all four purposes of the project, as well as provide a structure that would meet the transportation needs of the Port and the region for its planned 100-year design life. The Rehabilitation Alternative would still require replacement after its 30-year design life (see Section 1.8 for additional discussion comparing the proposed alternatives).

1.1.2.2 Project Need

The following discussion summarizes the present and projected deficiencies in the existing Gerald Desmond Bridge. These deficiencies explain the need for replacement of the bridge.

Bridge Condition

According to a County of Los Angeles Department of Public Works Bridge Inspection Report dated September 5, 2007, the bridge has a sufficiency rating of 43. Bridges that are found to be structurally deficient or functionally obsolete, as defined by FHWA, with a sufficiency rating of less than 80 are eligible for federal funding for rehabilitation. Bridges are eligible for replacement when they have a sufficiency rating of less than 50 (Caltrans, 2001).

The existing bridge is physically deteriorated. One of the major physical deficiencies of the bridge is that the concrete is spalling off the bridge in many areas. Pieces of fallen concrete weighing several pounds have been found, requiring the Port to install netting underneath the bridge to protect Port facilities and workers below.

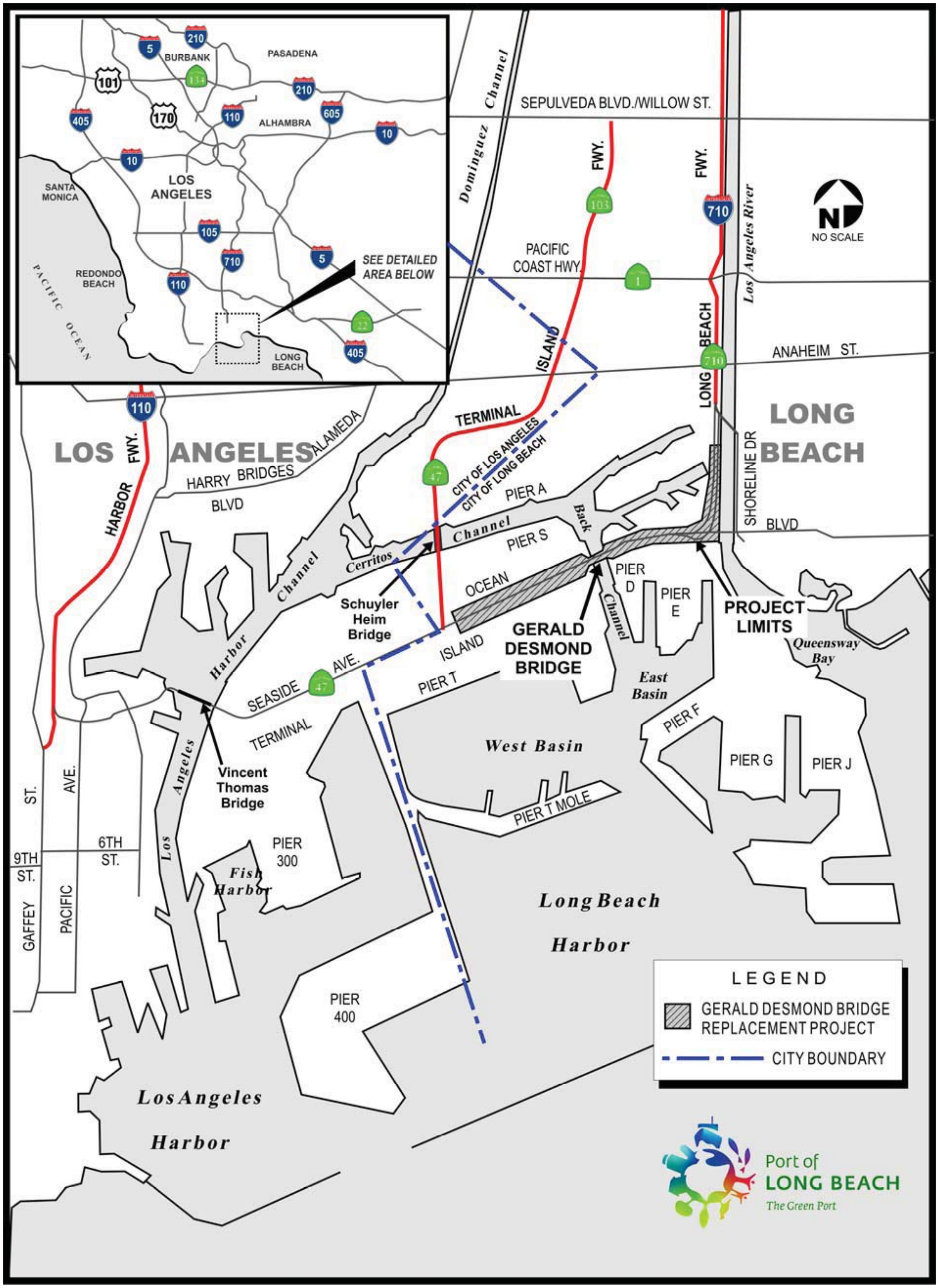

EXHIBIT 1-1
Project Vicinity and Project Location Map

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The bridge is also seismically deficient. It was designed in the early 1960s and completed in 1968. As with all bridges of that era in high seismic regions, its original construction has seismic performance issues that do not meet current seismic standards required by the American Association of State Highway and Transportation Officials (AASHTO), as well as Caltrans Seismic Design Criteria (SDC). Additional seismic deficiencies that do not meet current AASHTO or SDC requirements include the presence of lap splices at the base of columns and an insufficient amount of confinement reinforcement in the bridge columns. Both of these deficiencies will make it very difficult for the bridge to withstand a major earthquake without incurring significant damage to the columns and potentially threatening overall bridge integrity.

An assessment of the existing bridge was performed to evaluate whether it is in compliance with current AASHTO codes, as well as Caltrans seismic criteria, and to determine the extent of any bridge rehabilitation needed to comply with current codes.

Several reports, including a 2005 Inspection Report, 2002 Load Rating Report, and 1989 Fatigue Memorandum, were reviewed to confirm the condition of the existing bridge and estimate the amount of work and cost associated with bringing it up to the current AASHTO and Caltrans standards. A brief summary of findings from these reports is provided below:

- The Inspection Report cited the condition of the deck as “critical” and the condition of the paint as “extremely poor.” With the existing deck crossing seawater and now being 40 years old, the inspection found it would have to be replaced in the near future to protect the overall structural integrity of the bridge and improve its seismic response. Deck replacement would also necessitate replacement of all expansion joints. To prevent major deterioration of the bridge steel members, painting would also be required in the near future.
- The Load Rating Report indicated that the members of the arch main span were overstressed for all design truck loads and would need to be replaced.

The existing bridge underwent a seismic retrofit study in the early 1990s, followed by a seismic retrofit to improve its seismic performance. To minimize retrofit cost, partial steel column casings were added at select columns, such as Piers 15 and 16, to support the main steel truss span.

Traffic Capacity/Roadway Deficiencies

Capacity

In 2005, which is the Notice of Preparation (NOP) baseline year, approximately 38 percent of all traffic on the Gerald Desmond Bridge had an origin or destination in the Port of Long Beach and Port of Los Angeles (Ports) (Iteris, 2009). Of the approximately 59,700 vehicles per day (vpd) on the bridge, 15,200 or 25 percent were trucks (see Table 1-1).

The presence of substantial numbers of vehicles other than passenger cars (i.e., heavy-duty trucks) affects traffic flow in two ways: (1) these vehicles occupy more roadway space than passenger cars; and (2) the operational capabilities of these vehicles, including acceleration, deceleration, and maintenance of speed, are inferior to passenger cars and result in the formation of large gaps in the traffic stream, which reduces highway capacity. On long sustained grades and segments where trucks operate considerably slower, formation of these large gaps can have a profound impact on the traffic stream (Iteris, 2009).

The bridge is forecast to carry a substantial amount (39 percent) of non-port, regional through traffic in 2030 (Iteris, 2009). Regional traffic will increase due to several major development projects that have been constructed in downtown Long Beach, such as the Pike at Rainbow Harbor and the proposed San Pedro Waterfront Development in the Port of Los Angeles (POLA).

Year 2030 forecasted traffic volumes without the project are approximately 124,670 total trips per day (including 54,360 trucks or 43.6 percent of the total traffic) on the Gerald Desmond Bridge (Iteris, 2009). Table 1-1 summarizes the daily traffic and truck percentages over the project planning years.

Table 1-1
Daily Truck Percentages

Year	Daily Trucks	Percent Trucks	Daily Traffic
2005	15,200	25	59,700
2015 No Action	22,790	30	77,070
2015 Build	26,100	30	86,730
2030 No Action	54,360	44	124,670
2030 Build	59,730	44	135,930

Level of Service (LOS)

LOS is defined in six levels, from A through F. Level A is free-flow, high-speed conditions. At Level D, speed and maneuverability are reduced due to congestion, and Level F is a breakdown in flow, with speeds and vehicular throughput potentially dropping to zero. In 2005, peak-hour (i.e., morning, midday, and evening) traffic on the uphill segments (i.e., base of bridge to the crest) of the existing Gerald Desmond Bridge operated at LOS B or C in both the westbound (WB) and eastbound (EB) directions. In 2030, without the project, operations during peak hours are projected to be LOS F WB toward Terminal Island and LOS C EB toward Long Beach (Iteris, 2009).

Deficiencies

The primary roadway deficiencies are the lack of outside shoulders and the steep approach grades.

Shoulders: The lack of shoulders often results in broken-down trucks or passenger vehicles being stuck in the outside lane, effectively blocking or severely restricting the entire traffic flow in that direction of travel until the incident is cleared. The lack of shoulders also makes it more difficult for emergency vehicles and tow vehicles to gain access to the incidents. Providing outside shoulders would improve safety to the emergency responders and traveling public in these situations. The recent addition of climbing lanes on the bridge does not mitigate the need for breakdown shoulders because breakdowns still tie up the outside lanes as wider, slow-moving trucks must negotiate around incidents.

Approach Grades: The long, steep approach grades cause trucks to operate considerably slower, especially when passing, which creates large gaps in the traffic stream and further reduces highway capacity. The current approach grades are 5.5 percent on the west side of the bridge and 6 percent on the east side.

Vertical Clearance

The existing bridge is located over the main federal navigation channel (i.e., Back Channel) that serves the Port. It provides a vertical clearance of 156 ft (47.5 m) above MHWL, which is 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.

In addition, the vertical clearance afforded by the Southern California Edison (SCE) transmission lines crossing Cerritos Channel north of the bridge is only 153 ft (46.6 m) above MHWL. These transmission lines would be the primary vertical clearance hazard to navigation if the bridge clearance were to be increased.

1.2 SUMMARY OF CHANGES TO THE PROJECT FOLLOWING CIRCULATION OF THE JUNE 2004 DRAFT EIR/EA

Subsequent to the public comment period for the previously circulated Draft EIR/EA in June 2004, the Port elected to consider two additional alternatives: a bridge rehabilitation alternative and a tolling alternative (i.e., using tolls to fund bridge construction and operation). In addition, the Port updated the analysis of existing and future traffic conditions by collecting more recent traffic data and updating the projection of future traffic conditions based on recent forecasts of marine terminal activity and configuration.

The Bridge Rehabilitation Alternative would seismically retrofit the existing bridge by replacing the bridge deck and expansion joints, adding steel casings at all columns, foundation retrofit, replacing sway bracings, and painting of all steel members. After bridge rehabilitation, roadway operations within the project area would be the same as existing.

The proposed project limits (i.e., new bridge and related improvements, and SCE transmission line relocation) remain the same as that presented in the 2004 Draft EIR/EA; however, the study area was expanded, as described in the 2005 revised NOP, to address the tolling alternative as follows: Willow Street/Sepulveda Boulevard on the north end and Interstate 110 (I-110) on the west end. The tolling alternative was found to have effects beyond these expanded study limits, extending to Interstate 405 (I-405) to the north, I-110/SR 91 to the west, and into downtown Long Beach at Pine Avenue to the east (see Section 1.7.1). The south end of the project study area has not changed, terminating at Pico Avenue south of the Ocean Boulevard interchange.

Subsequently, the tolling alternative was not carried forward for further consideration, as discussed in Section 1.7. The study area was then reduced and is now slightly larger than the study area discussed within the 2004 Draft EIR/EA. The study area now extends along Ocean Boulevard from just west of Navy Way/Seaside Avenue on Terminal Island to Pine Avenue in downtown Long Beach. Project limits to the north and south have not changed from the 2004 Draft EIR/EA and extend to 9th Street on SR 710 to the north and to Pico Avenue south of Ocean Boulevard to the south.

With the addition of the tolling alternative, the rehabilitation alternative, the expanded study area limits, and updated traffic forecasts, the Port elected to update several technical studies supporting this revised Draft EIR/EA. These consisted of the Air Quality Analysis, Traffic Impact Analysis, Noise Study, Natural Environment Study, Visual Impact Analysis, Water Resources, and Hazardous Waste Initial Site Assessment (ISA). The revised Draft EIR/EA also includes a Health Risk Assessment (HRA). POLB issued the revised NOP in December 2005 and made it available to the public and responsible/ trustee agencies to provide comments regarding the revisions to the proposed project. No comments were received from either the public or responsible/trustee agencies during the public review period of the revised NOP.

Table 1-2 summarizes the major differences between the June 2004 Draft EIR/EA and the revised Draft EIR/EA for the Gerald Desmond Bridge Replacement Project.

Table 1-2
Summary of Key Differences between 2004 Draft EIR/EA and 2010 Revised Draft EIR/EA

Subject	2004 Draft EIR/EA	2010 Revised Draft EIR/EA
Alternatives	Analyzed a North-side Alignment Alternative, a South-side Alignment Alternative, and the No Action Alternative.	Analyzes a North-side Alignment Alternative, a South-side Alignment Alternative, a Bridge Rehabilitation Alternative, and the No Action Alternative. Also considers a Toll-Operation Alternative, but is not carried forward for further analysis (see Section 1.7.1).
Study Limits	Route 710 approximately 2,630 ft (801 m) north of Ocean Boulevard on the north end; the Terminal Island Freeway (SR 47) intersection on the west end; Los Angeles River on the east end; and Pico Avenue south of the Ocean Boulevard interchange on the south end.	The study limits are expanded along Ocean Boulevard to Navy Way/Seaside Avenue to the west and Pine Avenue in downtown Long Beach to the east.
New Bridge Vertical Clearance	Considered both 185-ft (56-m) and 200-ft (61-m) vertical clearance options.	Considers only a 200-ft (61-m) vertical clearance option, concluding that the 185-ft (56-m) clearance option does not provide sufficient vertical clearance for the design ship.[1]
Traffic Study, Air Quality Study, Noise Study, and Energy Analysis	Forecasted project effects to 2025 design year.	Forecasts project effects to 2030 design year. Also includes 2015 interim/opening year horizon, specifically for analysis of traffic and air quality effects.
CEQA Baseline	Compared traffic and relevant environmental effects based on analysis of future 2025 Build versus No Action Alternatives.	Compares traffic and relevant environmental effects to 2005 conditions (CEQA baseline – date of revised NOP).

[1] The Danish Maritime Institute (DMI) performed a study of the next generation of cargo vessels expected to be coming online. The purpose of the study was to define the design ship to use for establishing the height of the replacement bridge, given the proposed 100-year design life for the new bridge. The DMI recommended a 12,500 twenty-foot equivalent unit (TEU) ship as the design ship for the bridge replacement (FORCE Technology-DMI, 2002). This vessel has a vertical clearance of 180 ft (54.5 m). The design team concluded that a 5-ft (1.5-m) clearance was sufficient for the 100-year life of the new bridge and dropped the 185-ft (56-m) alternative from further consideration.

Table 1-2
Summary of Key Differences between 2004 Draft EIR/EA and 2010 Revised Draft EIR/EA

Subject	2004 Draft EIR/EA	2010 Revised Draft EIR/EA
Traffic Forecasts	Based on the previous traffic study, 70 percent of all traffic generated at the Ports was reported to use the Gerald Desmond Bridge. This equated to approximately 55,030 vpd, with 36 percent truck use during peak hours. By 2020, the number of containers in both ports was estimated to increase by approximately 276 percent. Forecasted traffic volumes were approximately 79,180 trips per day (including 27,700 trucks or 35 percent of total traffic) under the No Action Alternative and 88,690 under the Build Alternative on the Gerald Desmond Bridge by 2025.	Current traffic forecasts indicate that approximately 38 percent of all traffic generated at the Ports used the Gerald Desmond Bridge in 2005 (NOP baseline year). This equates to approximately 59,700 vpd with 25 percent truck use. Forecasted daily traffic volumes are approximately 124,670 (including 54,360 trucks or 44 percent of the total traffic) in 2030 under the No Action Alternative and 135,930 (including 59,730 trucks or 44 percent of total traffic) in 2030 under the Build Alternative.
Traffic Baseline	Existing year was 2002.	Existing year is 2005. As a consequence, the “existing condition” LOS analysis is different.
Traffic Operations	Two (2) intersections were analyzed for impacts.	Eleven (11) intersections are analyzed for impacts.
Traffic Analysis Methodology	The operational analysis for Ocean Boulevard was conducted using the Highway Capacity Manual (HCM) procedures. The HCM method cannot model a discontinuous lane (i.e., the truck climbing lane), resulting in the existing bridge being analyzed with two lanes in each direction. Also, the HCM method is limited to 25 percent trucks, so the additional truck percentage was analyzed by converting the additional trucks to passenger car equivalents (PCEs).	The operational analysis for Ocean Boulevard uses CORSIM (Corridor Simulation) software developed by FHWA. CORSIM tracks each vehicle independently through the modeled network of roadways. The method accounts for upstream and downstream segment operational effects on each roadway, whereas the HCM treats each segment in isolation. CORSIM can model a discontinuous lane, resulting in the existing bridge being analyzed with the truck climbing lanes (see below). (Use of CORSIM resulted in analysis with three lanes on the bridge upgrade and two lanes on the downgrade.) Also, the CORSIM model has no limitation on truck percentage.
Traffic LOS Analysis[2]	Bridge – Existing (4-lane): • WB LOS F (AM) • WB LOS F (Midday) • WB LOS F (PM) • EB LOS F (AM) • EB LOS F (Midday) • EB LOS F (PM) Bridge – 2025 No Action (4-lane): • EB LOS F (AM) • EB LOS F (Midday) • EB LOS F (PM) Pico Avenue/Pier E Street/EB Ocean Boulevard Ramps (2025 No Action): • LOS B (AM) • LOS C (Midday) • LOS D (PM)	Bridge – Existing (4-lane with climb lanes): • WB LOS C (AM) • WB LOS C (Midday) • WB LOS C (PM) • EB LOS C (AM) • EB LOS C (Midday) • EB LOS C (PM) Bridge – 2030 No Action (4-lane with climb lanes): • EB LOS C (AM) • EB LOS C (Midday) • EB LOS C (PM) Pico Avenue/Pier E Street/EB Ocean Boulevard Ramps (2030 No Action): • LOS C (AM) • LOS C (Midday) • LOS E (PM)

[2] Differences between the 2004 and 2010 revised Draft EIR/EA LOS are attributable to addition of PierPASS in later analysis (which reduced daytime truck volumes), change of the forecast year from 2025 to 2030, and new forecasts incorporating improvements made to the forecasting model, including throughput of TEUs at the ports, rail use, truck traffic data by shift, empty container traffic, an updated SCAG model forecast, a change in the existing year, and updated trip distribution.

Table 1-2
Summary of Key Differences between 2004 Draft EIR/EA and 2010 Revised Draft EIR/EA

Subject	2004 Draft EIR/EA	2010 Revised Draft EIR/EA
	New Bridge – 2025: • WB LOS D (AM) • WB LOS D (Midday) • WB LOS D (PM) • EB LOS D (AM) • EB LOS D (Midday) • EB LOS D (PM) New Ramp Junctions – 2025: • Pico Avenue to SR 710 Connector: – LOS B (AM) – LOS C (Midday) – LOS B (PM) • Off-ramp from SR 710 Connector to Pico Avenue: – LOS C (AM) – LOS C (Midday) – LOS C (PM) Pico Avenue/Pier E Street Intersection – 2025: • LOS B (AM) • LOS C (Midday) • LOS D (PM)	New Bridge – 2030: • WB LOS C (AM) • WB LOS C (Midday) • WB LOS C (PM) • EB LOS D (AM) • EB LOS C (Midday) • EB LOS D (PM) New Ramp Junctions – 2030: • Pico Avenue to SR 710 Connector: – LOS B (AM) – LOS B (Midday) – LOS B (PM) • Off-ramp from SR 710 Connector to Pico Avenue: – LOS B (AM) – LOS C (Midday) – LOS C (PM) Pico Avenue/Pier E Street Intersection – 2030: • LOS A (AM) • LOS A (Midday) • LOS C (PM)
Water Resources	Identified three (3) locations where treatment best management practices (BMPs) were proposed. The potential treatment BMPs identified were media filters, multi-chambered treatment trains, or detention basins.	Proposes eight (8) locations for treatment BMPs. The potential treatment BMPs identified are media filters and biofiltration swales.
Utilities and Service Systems – SCE Transmission Tower and Line Relocation	Disclosed it would be necessary to raise or otherwise relocate the SCE transmission towers and lines between the Long Beach Generating Station (LBGS) and Pier A. No specific plan was developed.	Discloses that it will be necessary to raise or otherwise relocate the SCE transmission towers and lines between the LBGS and Pier A. A detailed analysis was completed and recommended Option 3 as the most feasible solution for relocating the transmission lines.
NEPA Lead Agency	Approved by FHWA, as lead agency under NEPA.	Caltrans will be lead agency under NEPA due to passage of the Surface Transportation Project Delivery Pilot Program (Section 6005), under SAFETEA-LU.

1.3 PROJECT DESCRIPTION

1.3.1 Bridge Replacement

As previously noted, the proposed project would construct a new bridge across the Back Channel and associated roadway connectors, demolish the existing Gerald Desmond Bridge, and relocate the SCE transmission lines crossing Cerritos Channel north of the bridge (see Exhibit 1-2).

The new bridge, excluding approach structures, would be 2,000 ft (610 m) long, and it would be elevated 200 ft (61 m) above the MHWL of the Back Channel (see Section 1.6 for a detailed description). Bridge replacement would also necessitate reconfiguration of adjacent freeway and arterial interchanges.

1.3.2 Bridge Replacement Concepts

A study of the various types of possible bridges determined that a cable-stayed bridge would be the best option. A cable-stayed bridge consists of a continuous girder with one or more towers erected above piers in the middle of the span. From these towers, cables stretch down diagonally (usually to both sides) and support the girder. A design team consisting of Port staff representatives, an architect, and project engineers began the aesthetic design process with a review of the overall design parameters, such as the context of the surrounding site, the bridge roadway geometry, the recommended height and span for the bridge, and the estimated dimensions of the major structural members.

The team next considered aesthetics, cost, constructability, seismic performance, right-of-way (ROW) issues, schedule risk, impact to Port operations, and maintenance.

Based on the results of the design review, four cable-stayed alternatives were chosen for further consideration (see Exhibits 1-3 and 1-4):

- Single Mast Tower
- Delta Tower
- H-Tower with Vertical Legs
- H-Tower with Slanted Legs

An in-depth study of these four design options was conducted over an 8-month period and included more detailed analysis and design for each alternative. Concepts for architectural lighting of the bridges were developed. Additionally, the potential ROW impacts to third-party properties were more fully defined.

Based on this in-depth study, two design options were selected to be carried forward for further development: Single Mast Tower and H-Tower with Slanted Legs. With further refinements to the bridge concept study, the Port staff elected to proceed with the development of the Single Mast Tower with a steel composite deck.

1.3.3 SCE Transmission Line Relocation

Because 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 towers and lines that cross the Cerritos Channel north of the bridge be raised (see Section 2.1.4 [Utilities and Service Systems] and Appendix I). The vertical clearance afforded by the existing transmission lines is approximately 153 ft (46.6 m); therefore, the transmission lines would be the primary vertical clearance hazard to navigation if the bridge is raised. Exhibit 1-5 shows the location of the existing SCE transmission lines, Gerald Desmond Bridge, and other relevant features.

1.4 PROJECT BACKGROUND

The existing Gerald Desmond Bridge was constructed in 1968 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 by reconstructing the roadway area of the bridge to handle container trucks and improve LOS on the bridge. This improvement resulted in three ascending lanes and two descending lanes in each travel direction. Each climbing lane ends at the crest of the bridge. The bridge is a steel 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-long (124.8-m-long) suspended span that crosses the deep-water navigable channel connecting the middle and inner harbors of the Port (Parsons-HNTB, 2002a).

As the fifth largest seaport complex in the world, the Ports handle more than 30 percent of U.S. waterborne container cargo (POLB, 2006a). The bridge is a vital link in Port-area goods movement infrastructures because it is the westerly extension of SR 710, which is the primary access route for the ports and carries approximately 15 percent of all U.S. port-related container traffic (Caltrans *et al.*, 2005).

1.5 PROJECT LOCATION AND SETTING

The Gerald Desmond Bridge is one of three bridges connecting surface highways to Terminal Island in the harbor area. The bridge is located within the Port in an area zoned industrial. All land within the project limits is developed for port-related uses, and there is no special habitat or other environmental resource in the area. All areas surrounding the site are designated as industrial or commercial land use by Wilmington's Community Plan. There are several residences located east and north within 1-mile (mi) (1.6 kilometers [km]) of the site. The nearest receptor is the Golden Shores recreational vehicle (RV) park located approximately 0.3-mi (483 m) southeast of the eastern boundary of the project, across the Los Angeles River.

The Port owns most of this land, with several relatively small, privately owned properties located in the Inner Harbor area and northernmost sections of the Port. The bridge crosses the Back Channel and generally runs east-west across Pier D. It is located in three different Planning Districts in the Long Beach Harbor. These include the Northeast Harbor Planning District, the Terminal Island Planning District, and the Middle Harbor Planning District (POLB, 1999).

The proposed project and alternatives are located in the southwest portion of Long Beach at the southern end of Interstate 710 (I-710). I-710 is classified as SR 710 south of Pacific Coast Highway (PCH) in the State of California's Streets and Highways Code.

View of Gerald Desmond Bridge Looking Southwest

View of Gerald Desmond Bridge and SCE Transmission Towers Looking Southeast

Exhibit 1-2

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Single Mast Tower

Delta Tower

Exhibit 1-3
Bridge Design Options

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H-Tower with Vertical Legs

H-Tower with Slanted Legs

**Exhibit 1-4
Bridge Design Options**

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Port of LONG BEACH The Green Port

Exhibit 1-5
EXISTING CONDITIONS

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Under the Bridge Replacement Alternatives, the bridge and Ocean Boulevard, would become part of SR 710 and would operate as a freeway facility with controlled access. The improvements between the existing SR 710 and SR 47, including the bridge, would be transferred to Caltrans by easement following route adoption and execution of a freeway agreement. It is estimated that the transfer would be completed within 2 years after construction.

The proposed project is in the Back Channel/Cerritos Channel area of the Port. It is centered along Ocean Boulevard from the intersection of the Terminal Island Freeway (SR 47) at the western end to its eastern terminus at the westerly end of the bridge over the Los Angeles River. The southern limit of the project is located on Pico Avenue approximately 660 ft (201 m) south of the Ocean Boulevard interchange. The northern limit of the project is along SR 710, approximately 2,630 ft (801 m) north of Ocean Boulevard, and to the southernmost SCE tower on Pier A. Ocean Boulevard spans the Back Channel via the Gerald Desmond Bridge. The Ocean Boulevard/ Gerald Desmond Bridge portion of the project is located in the Middle Harbor and Terminal Island Harbor Planning Districts of the Port, and the SR 710 portion is located in the Northeast Harbor Planning District.

1.6 ALTERNATIVES

Like the revised Draft EIR/EA, this Final EIR/EA fully analyzes the North-side Alignment Alternative (identified as the preferred alternative [see Section 1.8.1]), the South-side Alignment Alternative, the Rehabilitation Alternative, and the No Action Alternative. Exhibit 1-6 shows the North-side Alignment Alternative, and Exhibit 1-7 depicts the South-side Alignment Alternative.

1.6.1 Bridge Replacement Alternatives

1.6.1.1 North-side Alignment Alternative (Preferred Alternative)

The North-side Alignment Alternative would provide a new bridge located approximately 140 ft (42.7 m) north of the existing bridge (measured from centerline to centerline). This bridge alignment would have a vertical profile over the Back Channel of 200 ft (61 m) above the MHWL. The roadway grades would be 5 percent in both directions.

The new bridge would be a cable-stayed design. The total bridge length would be 2,000 ft (610 m) long, with a main span opening across the channel of 1,000 ft (306 m), tower to tower. The west and east approach structures would be 3,117 ft (950 m) and 3,025 ft (925 m) in length, respectively.

The bridge cross section and approaches to the new bridge would include the following project features:

- Three 12-ft-wide (3.6-m) lanes in each direction
- A 10-ft-wide (3-m) outside shoulder in each direction
- A 10-ft (3-m) to 12-ft-wide (3.6-m) inside shoulder in each direction
- A 32-inch (in.)-high (81.3-centimeter [cm]) barrier that would run along the outside of each shoulder
- Reconstruction of the existing Horseshoe interchange ramp connectors
- Reconstruction of the existing connectors to SR 710 and the two ramp connections to Pico Avenue

The approach spans would be of concrete box girder construction, either segmental or cast-in-place.

This alignment alternative would use the land between the existing bridge and the LBGS (former SCE plant), and it would require construction of new ramps for the existing Horseshoe interchange. The proposed alignment would transition to join Ocean Boulevard approximately 3,280 ft (1,000 m) east of the channel, and the new connections would join SR 710 approximately 2,630 ft (801 m) north of Ocean Boulevard.

The Horseshoe interchange would use reconfigured ramps to provide access from the WB Gerald Desmond Bridge to Pier T Avenue and from Pier T Avenue to the EB Gerald Desmond Bridge. Additional ramp connections would be provided between Pier T Avenue and both Ocean Boulevard and the one-way frontage roads created by the newly constructed POLB Ocean Boulevard and SR 47 Interchange Project. These ramps would allow full access between Pier T Avenue and Ocean Boulevard in all directions.

At the SR 710 interchange, a new median connection to Ocean Boulevard in downtown Long Beach would be constructed, as would a new pair of connector ramps between SR 710 and the new bridge. A new hook ramp or loop ramp would be used to replace the existing on-ramp between Pico Avenue and the WB Gerald Desmond Bridge. The current ramps between Pico Avenue would be partially reconstructed to join the new connectors from SR 710. This interchange concept would enable trucks traveling to and from

SR 710 to remain in the outside lanes, while cars traveling to and from downtown Long Beach via Ocean Boulevard would remain in the inside lanes. This approach would minimize the intermixing of cars and trucks accessing the above-mentioned facilities. The estimated cost for this alternative is approximately $983 million.

1.6.1.2 South-side Alignment Alternative

The South-side Alignment Alternative would provide a new bridge located approximately 177 ft (53.9 m) south of the existing bridge (measured from centerline to centerline). As for the North-side Alignment Alternative, this bridge alignment would have a vertical profile over the Back Channel of 200 ft (61 m). The main span bridge design options would be the same as those proposed for the North-side Alignment. The bridge cross section and approaches to the new bridge would include the same project features as described for the North-side Alignment Alternative.

The proposed alignment would transition to join existing Ocean Boulevard approximately 3,280 ft (1,000 m) west of the channel. This alignment would require reconstruction of all ramps for the existing Horseshoe interchange and a portion of the existing Pier T terminal main gate facility. The proposed alignment would transition to join existing Ocean Boulevard approximately 3,280 ft (1,000 m) east of the channel, and the new connections would join existing SR 710 approximately 2,820 ft (860 m) north of Ocean Boulevard. The four existing ramp connections to Pico Avenue would have to be reconstructed for this alternative. The interchange design variations used for the North-side Alignment Alternative would also be applied to the South-side Alignment Alternative. The estimated cost for this alternative is approximately $1.0 billion.

1.6.1.3 Proposed Construction and Phasing

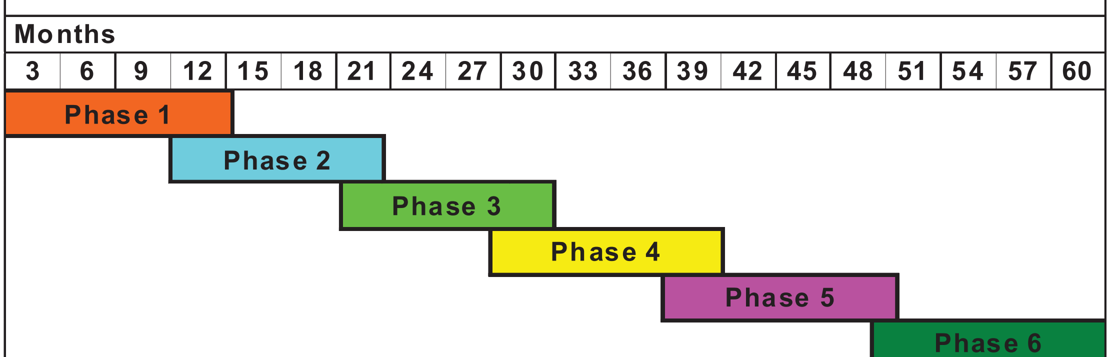
Construction of the new bridge, for either the North-side Alignment Alternative or the South-side Alignment Alternative, would take approximately 48 months, in five overlapping phases (Table 1-3; Phase 6 Gerald Desmond Bridge demolition would take 15 months, as discussed in Section 1.6.1.4). Construction is currently estimated to commence in September 2011 and terminate by September 2015, but the actual schedule is contingent upon the completion of final design and the availability of funding for the project.

At this time, it is envisioned that there would be two potential contractor staging areas. One could be located in or around the lumberyard located on the southwest side of the existing Gerald Desmond Bridge on Pier T Avenue, and the other at the current location of the Port Maintenance Yard on the east side of the existing bridge on Broadway. The Port Maintenance Yard is proposed to be relocated prior to construction of the new bridge.

Construction Phasing

Each construction phase is anticipated to take approximately 1-year (Table 1-3), but it is expected that the latter part of each phase would overlap with the beginning of the next phase, so that the total construction time would be approximately 48 months.

Table 1-3
Draft Construction Schedule: Gerald Desmond Bridge Replacement



Phase 1: Utilities
Phase 2: Detours and Main Span
Phase 3: SR 710/Horseshoe Interchange
Phase 4: Connectors and Main Span
Phase 5: Tie-ins
Phase 6: Demolition (15 Months)

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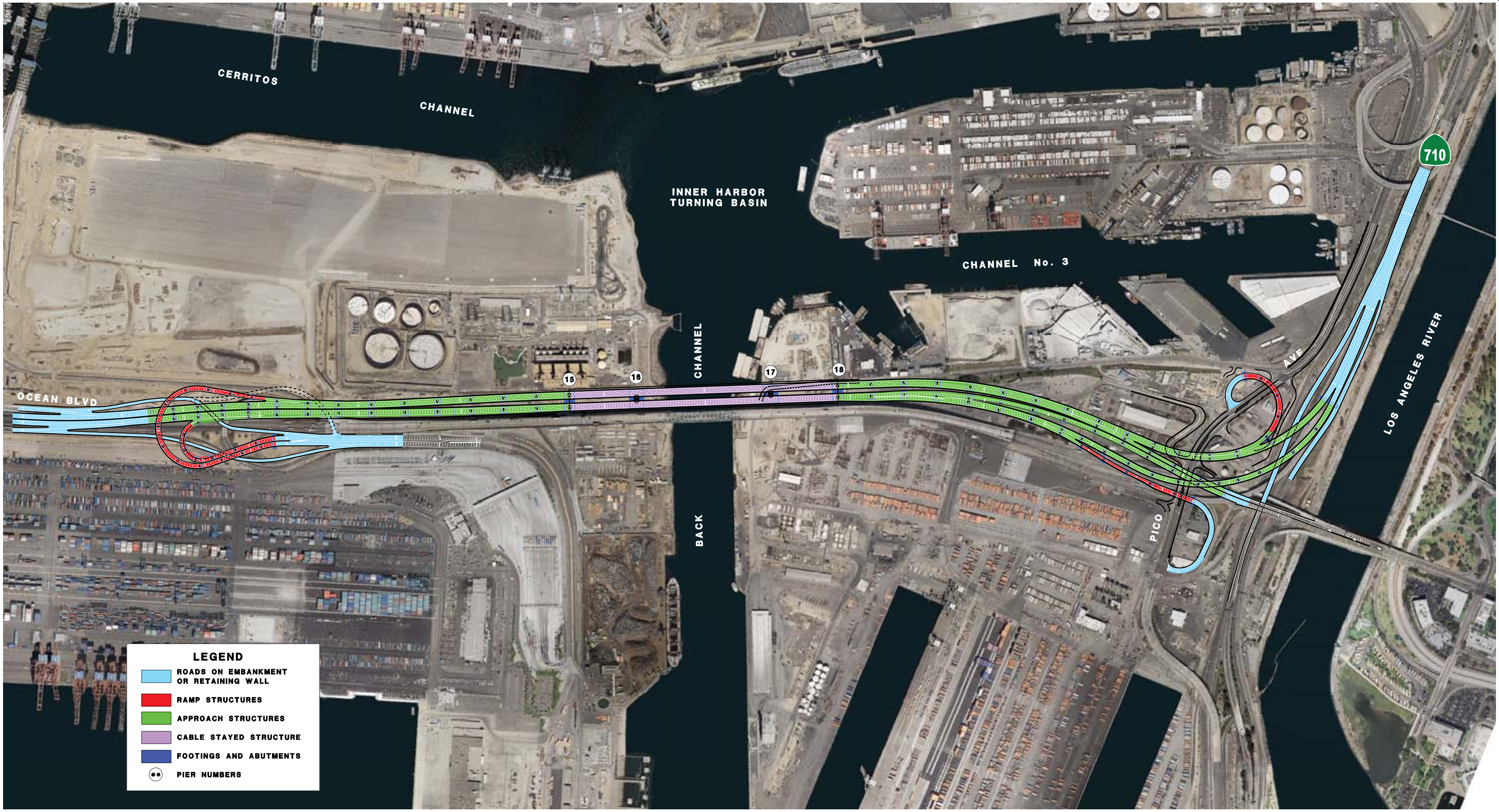

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EXHIBIT 1-6

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SECT. HEAD ______ P.E. NO. C-

ASS'T CHIEF HARBOR ENGR. P.E. NO. C-25677 DATE ....
CHIEF HARBOR ENGINEER P.E. NO. C-43065 DATE ....

Port of LONG BEACH
The Green Port

GERALD DESMOND BRIDGE REPLACEMENT PROJECT

NORTH-SIDE ALIGNMENT ALTERNATIVE

SCALE ____________ SHEET ______ OF ______
SPECIFICATION NUMBER ________________________
DRAWING NUMBER ________________________

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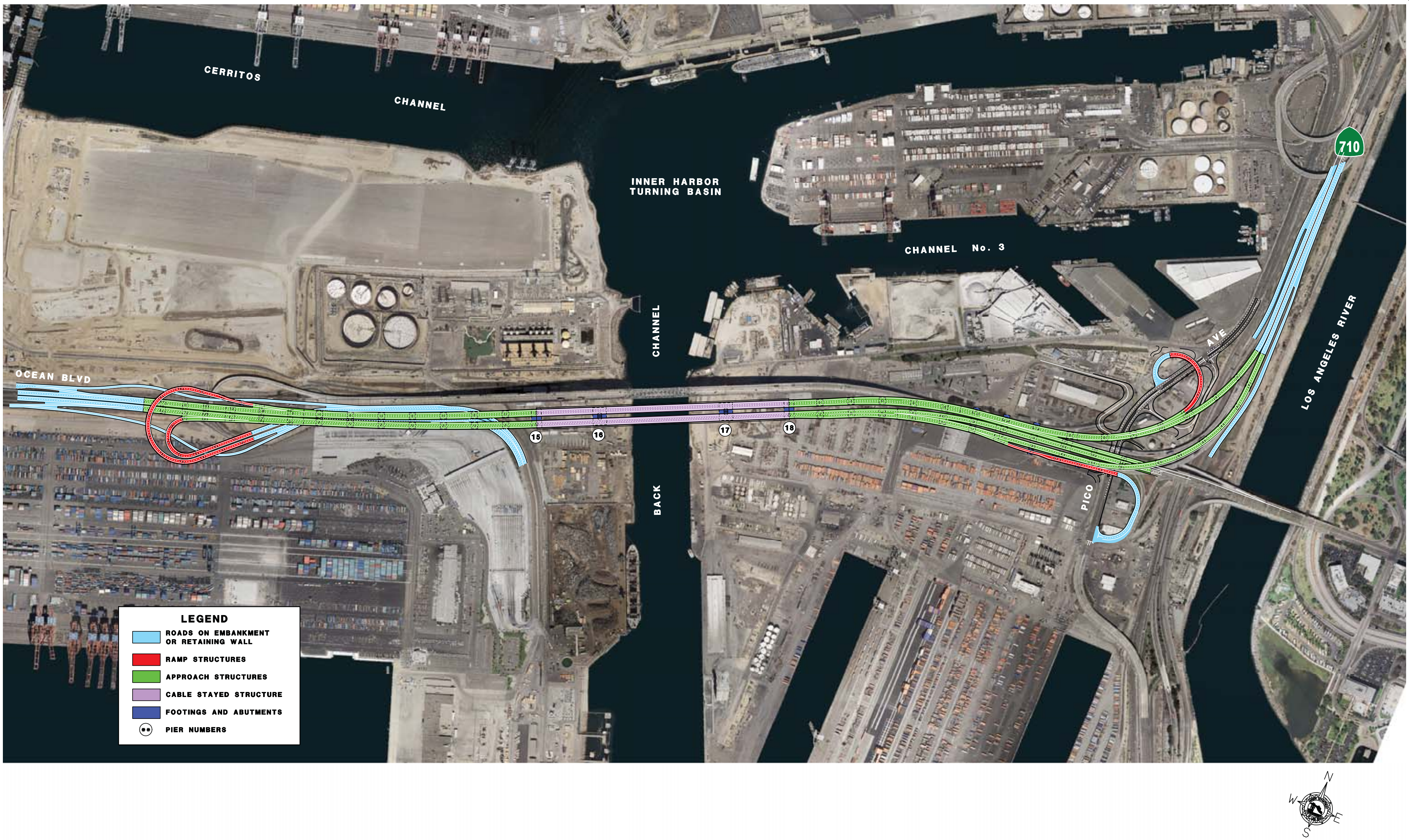

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DRAWN DWP DATE 03/28/08
DESIGNED ________ P.E. NO. ________
PROJ. MGR. ______ P.E. NO. ________
SECT. HEAD ______ P.E. NO. C-______

ASS'T CHIEF HARBOR ENGR. P.E. NO. C-25677 DATE ....
CHIEF HARBOR ENGINEER P.E. NO. C-43065 DATE ....

Port of LONG BEACH The Green Port

GERALD DESMOND BRIDGE REPLACEMENT PROJECT

SOUTH-SIDE ALIGNMENT ALTERNATIVE

SCALE ____________ SHEET ______ OF ______
SPECIFICATION NUMBER ____________
DRAWING NUMBER ____________

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Phase 1:

In the first phase, the utilities in the project area would be relocated, and the railroad that parallels Ocean Boulevard on Pier S would be realigned. A WB ramp would be constructed to connect Pier T Avenue to SR 47, replacing the existing WB lane. Traffic would be diverted to the new ramp. Detour routes would be installed at Ocean Boulevard and the WB Ocean Boulevard/Pico Avenue on- and off-ramps. The inner left lane of southbound (SB) traffic on Harbor Scenic Drive would be maintained during construction of a SB on-ramp connecting Harbor Scenic Drive with Ocean Boulevard. Buildings and appurtenances at the Port Maintenance Yard facility would be demolished and removed in this phase for the North-side Alignment Alternative only. Relocation of the Port Maintenance Yard operations would temporarily be moved to an interim site and separately permitted by the Port. Ultimately, the Maintenance Yard would be co-located with the Administration Building Complex, as identified in the Final EIR for the Administration Building and Maintenance Facility Project. This phase would also involve the bridge Pier 16 foundation construction, including excavation, sheet pile installation, cast-in-steel shell pile placement, and construction of footings.

Phase 2:

The second phase would involve routing traffic onto the detour routes installed in Phase 1, establishing additional detours and temporary closures, and beginning work on the new main-span bridge and high-level approaches. This phase would also involve preparatory roadway work at each interchange. The following tasks describe construction of the main span and high-level approaches (see Exhibits 1-6 and 1-7 for the locations of the bridge piers referred to below):

- Task 1 – Main-span tower construction at Pier 16, proceeding from the foundation to the top of the tower.
- Task 2 – Construction of the steel composite deck at Pier 16.
- Task 3 – Bridge Pier 17 foundation construction; Pier 17 construction activities would follow Pier 16 construction by approximately 6 months and would involve similar activities.
- Task 4 – Main-span tower construction at Pier 17.
- Task 5 – Construction of steel composite deck at Pier 17.
- Task 6 – Bridge Pier 15 foundation construction; foundation construction would follow Pier 17 construction by approximately 6 months and would involve similar activities.
- Task 7 – Bridge Pier 15 construction; bridge pier construction would occur approximately midway during main span construction and involve construction of columns and pier cap.
- Task 8 – Bridge Pier 18 foundation construction; foundation construction would follow Pier 15 construction by approximately 6 months and would involve similar activities.
- Task 9 – Bridge Pier 18 construction; bridge pier construction would follow Task 8 Bridge Pier 15 construction by approximately 6 months and would involve similar activities.
- Task 10 – Main-span superstructure completion, including structure closure, deck overlay, and traffic barrier construction.
- Task 11 – High-level approach foundation construction would start in parallel with the main span construction, involving similar activities for main span foundation construction with smaller diameter piles.
- Task 12 – High-level approach columns construction would follow and stagger as each foundation is complete.
- Task 13 – High-level approach superstructure construction would follow using the balanced cantilever segmental construction method. Cast-in-place or precast segments may be used.

Phase 3:

In the third construction phase, a portion of the SR 710 and Horseshoe interchange structures on either side of the channel would be reconstructed. A portion of Harbor Scenic Drive roadway would be constructed.

Phase 4:

The fourth phase would involve removal and reconstruction of the EB mainline curve to northbound (NB) SR 710, the WB Horseshoe off-ramp, and the east and west tie-ins of the EB mainline. A retaining wall would be constructed at the south side of Ocean Boulevard near SR 47. During this phase, the WB Ocean Boulevard traffic would be shifted onto the new Gerald Desmond Bridge, and one lane of traffic on EB Ocean Boulevard would be maintained. The remaining portion of Harbor Scenic Drive would also be constructed.

Phase 5:

In this last construction phase, the final tie-ins with the existing ramps and mainline curves would be constructed, equipment would be demobilized, all detours would be removed, and final grading would be completed. In this phase, WB and EB Ocean Boulevard traffic would be utilizing the new Gerald Desmond Bridge.

1.6.1.4 Proposed Demolition and Phasing

Existing Bridge Demolition

Demolition of the existing bridge in Phase 6 would be the same for either the North-side Alignment Alternative or the South-side Alignment Alternative. Demolition would be completed in approximately 15 months. It would include removal of the main steel truss spans, the steel plate girder approaches, and the ramps, including both superstructure and bents.

No explosives would be allowed for removing any part of the bridge. Space under the bridge would be available to allow sections of the superstructure to be lowered onto the ground for more efficient demolition and removal. The navigational channel under the main span may be temporarily closed during demolition. The suspension spans of the truss spans can be lowered onto barges, towed to shore, and off-loaded to the same space under the bridge used for demolition and removal of the sections over land. Substructure columns would be removed to an elevation 2 ft (0.6-m) below existing grade, leaving the existing pile caps and piles in place. Steel salvaged from the demolition would become the property of the demolition contractor to offset some of the cost. Lead-based paint (LBP), asbestos-containing materials (ACM), or any other hazardous materials would be handled and disposed of in accordance with federal, state, and local laws and ordinances.

Demolition of Main Steel Truss Spans

Stage 1:

The main span truss structure would be removed beginning with the "suspended" portion of the deck, which is located over the channel. The concrete deck slab and steel floor beams supporting the deck slab would be removed progressively from midspan toward each end of the suspended portion of the span. The truss members and lateral sway bracing would not be removed at this stage to ensure stability during deck removal.

Stage 2:

Once the deck was removed in the suspended portion of the bridge, the suspended truss section would be cut loose from the remaining truss and suspenders and lowered onto a barge as one unit. This section would be disassembled at a remote site.

Stage 3:

With the suspended section now removed, removal of the remaining deck slab and floor beams would progress from the suspended span toward the ends of the main span truss. As for the suspended span, the truss and sway bracing would remain in place for stability during this process.

Stage 4:

Once all of the deck is removed, the remaining truss would be disassembled beginning near the midspan section over the channel and progressing toward each end of the truss. It is likely that large sections of the truss would be cut loose and lowered to the ground where they would be cut up and transported offsite. Temporary support towers would be used for the anchor spans, as needed, to stabilize the existing truss as sections were removed.

Stage 5:

The temporary support towers and existing concrete columns would be removed to 2 ft (0.6-m) below the finished ground elevation.

Demolition of Steel Plate Girder Approaches and Ramp

Stage 1:

The concrete deck of the approach spans would be saw cut and removed.

Stage 2:

The steel plate girders at every other span would be cut off near the hanger assembly and removed.

Stage 3:

The remaining steel plate girders would be removed.

Stage 4:

The concrete columns would be removed down to 2 ft (0.6-m) bgs.

During all phases of construction and demolition over the Back Channel, protective netting would be utilized to prevent debris from falling into the channel. Heavy construction activities over the channel would be coordinated with shipping activities to ensure safety for vessels and construction workers.

All demolition materials would be recycled to the extent feasible, in accordance with the City of Long Beach Construction and Demolition Recycling Program.

Other Demolition Requirements

Both the North- and South-side Alignments would require demolition and/or relocation of adjacent structures within the proposed new bridge alignments. The North-side Alignment would affect several buildings on Port-administered property and one building on privately owned property. The South-side Alignment would affect several buildings on Port-administered land. The environmental consequences related to demolition and/or relocation of adjacent facilities are addressed in Chapter 2. A determination of significance of the potential environmental consequences resulting from the proposed alternatives pursuant to CEQA is provided in Chapter 3.

1.6.1.5 SCE Transmission Line Relocation

The proposed project, with either of the bridge replacement alternatives, also includes raising the SCE lines (12.5 kilovolt [kV], 66-kV, and 220-kV) that cross the Cerritos Channel from Pier S to Pier A, north of the bridge (see Section 2.1.4 [Utilities and Service Systems] and Appendix I). The timing of the transmission line relocation is not known at this stage of project development, but it can be assumed that this action would not be required until the bridge replacement is completed.

The recommended option for raising the SCE lines is to construct new towers on Piers S and A next to the existing towers. The new towers would increase the clearance over the Back Channel from 153 ft to 200 ft. Subsequent to construction of the new towers, all lines would be relocated to the new towers (see Exhibit 2.1.4-1 for the proposed configuration under this scenario). Although the transmission lines would be relocated to the new towers, the existing towers, which have been determined to be eligible for listing on the National Register of Historic Places (NRHP) (see concurrence letter from State Historic Preservation Officer [SHPO], July 21, 2003, Appendix C) would remain in place.

1.6.2 Bridge Rehabilitation Alternative

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 SDC joint capacity protection requirements. Typical for this type of bridge in the state of California, retrofit measures for truss members include member strengthening and installation of additional bolted through steel plates at truss joints, similar to the retrofit of the existing Carquinez Bridge, San Francisco Oakland Bay Bridge Main Span, and others.

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

- Replacement of the bridge deck
- Replacement of expansion joints
- Replacement of the sway bracings for the main span
- Painting of all steel members
- 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.

1.6.3 No Action Alternative

Under the No Action Alternative, the Gerald Desmond Bridge would not be replaced or rehabilitated. It would remain in its existing deteriorated condition until a retrofit schedule is established. It would remain with insufficient roadway capacity to handle projected car and truck traffic volumes, and inadequate channel clearance for safe passage of some existing and new-generation container ships.

Under the No Action Alternative, the existing bridge would continue in use as the sole direct connection between SR 710, Long Beach, and Terminal Island. Existing measures to protect against falling structural elements would need to be enhanced as the bridge continues to deteriorate, and the related safety issues would increase in severity. 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.

Under the No Action Alternative (as with the Rehabilitation Alternative), the existing SCE transmission lines would not be removed or relocated.

1.7 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD FOR ANALYSIS

The June 2004 Draft EIR/EA evaluated several other alternatives, including tunnel options, main span and approach span options, design options, and interchange options, that were all withdrawn from further evaluation. In addition, a Toll-Operation Alternative was considered in the revised Draft EIR/EA; however, it was withdrawn from further evaluation based on the findings discussed below. The rationale for withdrawal of the Toll-Operation Alternative, as well as the other alternatives previously considered, is discussed in this section.

1.7.1 Toll-Operation Alternative

A tolling alternative was considered because the Port is looking at various funding sources (including federal, state, and local sources) to help pay for the cost of the new bridge. This alternative was considered given that tolling is used on many northern California bridges as a primary revenue source; therefore, POLB and POLA jointly sponsored a Terminal Island Traffic and Toll Revenue Study to assess the following options:

1. Tolling the Gerald Desmond Bridge replacement structure alone; and
2. Tolling all three bridges that provide access to Terminal Island (i.e., Gerald Desmond replacement, Vincent Thomas, and Schuyler Heim) in a toll district.

Based on the tolling study, solely tolling the Gerald Desmond Bridge would result in much greater traffic diversion to non-tolled facilities and alternative routes than discussed in Section 1.7.1.2 and would generate 75 percent less toll revenues over the 30-year study period; therefore, tolling only the Gerald Desmond Bridge was not recommended as a viable Toll-Operation Alternative variation during project development.

The Toll-Operation Alternative was introduced in the revised NOP (December 2005), and it has the same footprint as the North-side Alignment Alternative. Under this alternative, vehicles that enter/leave Terminal Island on any of the three bridges (i.e., Gerald Desmond replacement, Vincent Thomas, or Schuyler Heim) would be assessed a toll in each direction. Except for the toll element, which would involve placement of sensors on all three bridges, the bridge design features would be the same as described for the North-side Alignment Alternative.

The Toll-Operation Alternative would utilize both automatic License Plate Recognition (LPR) and transponder technologies, and it would operate without toll booths. The LPR technology would assess tolls to the vehicles that do not have a transponder.

1.7.1.1 Implications of Toll-Operation Alternative

The Gerald Desmond Bridge Traffic Study identified substantial traffic diversions from this alternative (Iteris, 2009). The diversion resulting from tolling all three bridges would principally affect regional traffic – traffic with neither an origin nor a destination on Terminal Island, but simply passing through the island. Some regional traffic passing through Terminal Island with free bridges would be induced to avoid Terminal Island when tolls are imposed on the bridges. Little diversion of traffic with one trip end on Terminal Island would result from tolling all three bridges because this traffic must cross one of the three bridges. The following provides a summary of both the traffic diversion and environmental issues associated with the Toll-Operation Alternative.

1.7.1.2 Traffic Diversion

The 2030 traffic diversion impacts associated with this alternative compared to the North-side Alignment Alternative (non-toll) and the No Action Alternative for a series of key roadway links are summarized below. Year 2030, rather than the 2015 opening year horizon, was analyzed due to higher forecast traffic volumes in 2030 simulating the worst-case scenario.

- I-405: This freeway would experience an increase of approximately 1,500 to 2,600 autos, or approximately 3 to 5 percent, directionally during the peak periods. Truck volumes would increase roughly 3 to 4 percent.
- I-110: This freeway would experience an increase in auto volumes of up to 20 percent, or nearly 3,500 vehicles in one direction during the PM peak period. Truck volumes would increase up to 41 percent during all peak periods.
- SR 710: This freeway would experience a decrease in auto volumes of up to 16 percent directionally, which equates to nearly 3,500 autos during the PM peak period. Truck volumes would decrease up to 7 percent directionally, or approximately 1,200 trucks during the peak period.
- SR 91: This freeway would experience an increase of nearly 2,000 autos directionally during the PM peak period, which represents a 5 percent increase. Truck volumes would increase more than 340 vehicles in one direction, which is an increase of more than 18 percent in truck flow.
- SR 47/103: This freeway would experience an 11 to 28 percent decrease in auto volumes near Terminal Island and a decrease in truck volume of up to 13 percent.
- PCH and Anaheim Street: These local arterials would experience an increase in auto volumes from 500 to 1,000 vehicles during the peak periods. Between SR 710 and SR 47, auto volumes on both facilities would increase up to 24 percent directionally. Truck volumes on both of these routes would increase approximately 10 percent.
- Ocean Boulevard/Seaside Avenue: The traffic modeling results indicate an auto volume decrease of approximately 40 to 45 percent, or up to 5,400 peak-period vehicles in each direction. The drop in auto volumes would be similar on both the Vincent Thomas Bridge and the replacement bridge. Truck volumes would drop 12 percent, or 485 peak-period trucks, on the replacement bridge.

Due to the traffic diversion discussed above, the following roadway segments would require mitigation in the form of an additional travel lane in each direction:

- I-405 between SR 710 and I-110
- I-110 south of SR 91
- SR 91 between SR 710 and I-110
- Anaheim Street between 9th Street and I-110
- PCH between SR 47/103 and I-110

The above improvements equate to approximately 41.2 lane miles of additional capacity needed on the freeways and 13.6 additional lane miles on the arterials. To provide the additional lane capacity along the arterials, existing on-street parking would be restricted during the peak periods. At locations where on-street parking is already restricted during the peak periods, or there is insufficient width to handle the additional lane, then outside widening would be necessary and ROW impacts would occur.

1.7.1.3 Environmental Effects

The Toll-Operation Alternative would result in substantial unavoidable adverse impacts to the environment, when compared with the non-toll North-side Alignment Alternative, which would be necessitated by the widening of major arterials and freeway segments in the affected areas to handle the traffic diversion that would occur. The following discussion highlights the expected ROW and land use impacts due to this traffic diversion.

- Anaheim Street: Widening would lead to environmental impacts, including ROW acquisitions and relocations, hazardous wastes exposure, community impacts, utility relocations, and use of Section 4(f) properties (i.e., public parks and recreation areas, which are protected under the U.S. Department of Transportation Act of 1966). Approximate ROW displacements would be as follows:

  - 10 residential apartment complexes, primarily on the north side. These apartment complexes range in size from 10 to 50 units. They are set back approximately 6 to 10 ft (1.8 to 3 m) from the edge of the street. Given the demographics of this area, with a higher population of low-income and minority residents, these apartment complexes would likely be inhabited by a higher percentage of low-income residents, who are subject to federal environmental justice provisions.
  - 50 businesses (e.g., used car sales, fast food, auto parts, check cashing, adult entertainment uses, liquor stores, and small retail).
  - 40 auto wrecking yards/auto repair and gas stations.
  - Saints Peter and Paul School ball field located on the south side of Anaheim Street. This would be a potential Section 4(f) use.
- PCH: Widening would lead to environmental impacts, including ROW acquisitions, hazardous wastes, community impacts, utilities, and Section 4(f) use. Approximate ROW displacements would be as follows:
  - 10 residential apartment complexes. These apartment complexes range in size from 10 to 30 units. They are set back approximately 6 to 10 ft (1.8 to 3 m) from the edge of the street. Given the demographics of this area, with a higher population of low-income and minority residents, these apartment complexes would likely be inhabited by a higher percentage of low-income residents, who are subject to federal environmental justice provisions.
  - 35 businesses (e.g., used car sales, fast food, motels, auto parts, check cashing, adult entertainment, liquor stores, and small retail).
  - 30 auto wrecking yards/auto repair and gas stations.
  - Banning High School is located on the north side of PCH, and Banning Park is located on the south side, both near Avalon Boulevard. There would be impacts to the ball field that is adjacent to PCH, which could constitute a Section 4(f) use.
  - Senior Citizen Community Center, which is located near Eubank Avenue, could be impacted by the street widening.
- I-110, I-405, and SR 91: Widening these freeways to handle traffic diversion from the tolling alternatives would likely require acquisition of adjacent residential and commercial properties at arterial interchanges.

1.7.2 Tunnel Options

Two types of tunnels were evaluated: (1) a concrete immersed tube tunnel; and (2) a bored tunnel through grouted soils. While both tunnel options were determined to be constructible, they were found to have more Port operational problems than any of the bridge options that were considered. The tunnel alternatives would cost approximately 3.5 times more to construct than either the North- or South-side Alignment Alternatives. In addition, the cost of the operation and maintenance of the tunnel alternative would be approximately 2 times the cost of the bridge alternative (Parsons Brinckerhoff Quade & Douglas, Inc., 2001). The tunnel options would have required Back Channel closure during construction.

Environmental impacts included containment and disposal of contaminated bay muds, hazardous materials control, and a new source of air pollution at the tunnel portals. In addition, water infiltration of tunnels and approaches below the water table would have been inevitable; therefore, the system would require a drainage system (Parsons Brinckerhoff Quade & Douglas, Inc., 2001).

The design of a tunnel would have required a 6 percent grade, 1-percent greater than the bridge alternative, which would have slowed down truck traffic. Also, the tunnel roadway would have been narrower than that of the bridge, as full-width shoulders could not have been handled. A tunnel option would have required work to be performed from barges in the Back Channel. This would have impeded access for vessels trying to reach piers in the Inner Harbor. The channel would have been closed at various times during the approximate 5 years of construction. Channel closures and access restrictions would have caused a slowdown in Port operations, as cargo would not have been loaded/unloaded to and from the vessels in a timely manner. Several existing piers and other facilities would have had their access blocked by the construction as well.

For the above reasons, tunnel options were withdrawn from further consideration as infeasible.

Detailed information on the above tunnel options is presented in the Draft Alternative Bridge Evaluation Study (Parsons-HNTB, 2002b).

1.7.3 Bridge Design Options

A variety of bridge and approach span options were examined, and they are described in the Draft Alternative Bridge Evaluation Study (Parsons-HNTB, 2002b). Potential environmental impacts of the main-span and approach span options were not examined, but they would not have differed among the options considered or from those identified for the build alternatives studied in detail. Several options were determined to be unsuitable for the project, as noted below.

1.7.3.1 Main-Span Options

Five types of main-span bridges were examined: movable bridge, steel box girder, cable-stayed, steel truss, and steel tied arch. Additionally, a suspension bridge crossing was considered but not pursued because a conventional suspension bridge would not be possible at the location of the Gerald Desmond Bridge due to poor soil conditions, while a self-anchored suspension bridge would be prohibitively expensive compared to a cable-stayed bridge for a project of this type.

The movable bridge was determined to be unsuitable for the Gerald Desmond Bridge site due to its impacts to traffic operations, large annual operating and maintenance (O&M) costs, susceptibility to seismic events, and restrictions on horizontal navigation clearance. A movable bridge would also cause substantial disruptions to Port operations. The steel box girder was also found to be unsuitable, as it requires more structural depth than the other options, resulting in the need for more than 600 ft (183 m) in additional approach span length on each end of the bridge.

Preliminary design was performed on the cable-stayed, steel truss, and steel tied arch bridges so that estimated costs could be calculated and weighed along with the aesthetics and maintenance requirements of each bridge, as well as their possible impact upon Port operations. The cable-stayed bridge was found to be the most suitable option for the new bridge, as it had the lowest cost, required the least maintenance, would affect Port operations the least during its construction, and was most aesthetically pleasing. Consequently, the steel truss and steel tied-arch options were also removed from further consideration.

1.7.3.2 Approach Span Options

Five types of approach spans were evaluated: pre-cast concrete bulb-tee girder, concrete segmental box girder, cast-in-place concrete box girder, steel I-girder, and steel box girder. Preliminary design was performed for each approach span to determine the size of bridge members and quantities so that estimated costs could be calculated. The approach span options were then compared on the basis of cost, aesthetics, maintenance requirements, and impact on Port operations. Based on the above analysis, concrete segmental box girders were selected for the high-level approaches, and cast-in-place concrete box girders were selected for the low-level approaches.

1.7.4 Horseshoe Interchange Variations

Two variations were examined for integrating the new bridge with a reconstructed Horseshoe interchange: the “Modified Parclo” interchange and the “Modified Diamond” interchange. Potential environmental impacts of the Horseshoe interchange variations were not examined, but they would not have differed among the variations considered or from those identified for the build alternatives studied in detail.

A "Parclo" interchange ("partial-cloverleaf") provides grade separation for the through lanes of two intersecting roadways, typically a local street crossing a freeway, and it provides a combination of ramps and traffic signal-controlled intersections to facilitate traffic flow between the two roads. A Parclo interchange provides two loop-ramps located in opposite quadrants such that both off-ramps from the freeway (in both directions) are handled by loop ramps. The on-ramps are provided using "direct ramps" that terminate at signalized intersections on the local street. Conversely, a Parclo may also be configured to have the loop ramps serve the on-ramps in both directions, and the other movements facilitated using ramps that terminate at signalized intersections on the local cross street. A "Modified Parclo" is a variation for the standard Parclo configuration such that one or more of the typical ramps or typical configuration is modified in some way.

A "Diamond" interchange provides grade separation for the through lanes of two intersecting roadways, typically a local street crossing a freeway, and it provides a combination of ramps and two traffic signal-controlled intersections at the intersection of the ramps with the cross street to facilitate traffic flow between the two roads. The left- and right-turn movements to the on-ramps and from the off-ramps are facilitated at the traffic signal-controlled ramp/local street intersections. A "Modified Diamond" is a variation of a "Standard Diamond" configuration where one or more of the ramps or the typical geometry is modified in some way.

The "Modified Parclo" and "Modified Diamond" designs for the Horseshoe interchange were called "modified" because the cross street (i.e., Pier T Avenue) is parallel to Ocean Boulevard; hence, providing ramps and interconnection between the two roadways did not result in standard "Parclo" or "Diamond" configurations.

1.7.4.1 Modified Parclo

The “Modified Parclo” interchange would use a loop ramp from WB Ocean Boulevard to provide access to Pier T Avenue, carrying traffic off of the new bridge and then under Ocean Boulevard to meet Pier T Avenue. An on-ramp for accessing EB Ocean Boulevard from Pier T Avenue, similar to the current ramp, would also be established. Additional ramp connections would be provided between Pier T Avenue and both Ocean Boulevard and the one-way frontage roads created by the Ocean Boulevard and SR 47 Interchange Project. These ramps would allow for full access between Pier T Avenue and Ocean Boulevard in all directions. Due to the additional ROW impacts to Pier S associated with the loop ramp, this alternative was removed from further consideration.

1.7.4.2 Modified Diamond

The “Modified Diamond” interchange would use diamond ramps from the WB replacement bridge to a new road that would pass underneath the elevated Ocean Boulevard, and from that road to the EB replacement bridge. This new road would provide access to the new Pier T Avenue and would be linked by a one-way frontage road to the signalized intersection at the end of SR 47 to the west. Due to the additional delays created by the new intersections with this alternative and the operational inefficiencies to the trucks accessing the Pier T terminal facility at this interchange, the “Modified Diamond” was removed from further consideration.

1.7.5 Route 710 Interchange Variations

Two variations were examined for integrating the new bridge with a reconstructed Route 710 interchange: the “Mainline Connection to Route 710” and the “Connector Connection to Route 710.” Potential environmental impacts of the Route 710 interchange variations were not examined, but they would not have differed among the variations considered or from those identified for the build alternatives studied in detail.

1.7.5.1 Mainline Connection to Route 710

The “Mainline Connection to Route 710” design variation called for the construction of a new six-lane mainline connector between the median of Route 710 and new connector ramps to downtown Long Beach via Ocean Boulevard. The new connections to downtown Long Beach would be relocated to/from the right of the new bridge. Elevated hook ramps supported on bridge structures would replace the existing WB ramps from the replacement bridge to Pico Avenue. The existing hook ramps for the EB replacement bridge would remain in place. Due to the unmitigatable LOS F operating conditions that would occur at the merge of the Ocean Boulevard ramps to/from downtown Long Beach, this design variation was removed from further consideration.

1.7.5.2 Connector to Route 710

The “Connector to Route 710” would replace the existing two-lane connector from the EB Gerald Desmond Bridge to NB Route 710 with a new 2-lane connector at the same location. The existing 2-lane connector from SB Route 710 to the WB Gerald Desmond Bridge would be retained, as would the current ramps between EB Ocean Boulevard and Pico Avenue. The existing diamond ramp from Pico Avenue to WB Ocean Boulevard would be replaced by a loop ramp. This variation, known as the “minimum service alternative,” would also require 6 percent approach grades on the new bridge and be limited to a vertical clearance of 185 ft (56 m). Due to the desire to provide improved truck operations on the new bridge (i.e., having approach grades of less than 6 percent), this alternative was removed from further consideration.

1.8 COMPARISON OF ALTERNATIVES

The North-side Alignment Alternative would achieve the project’s purpose and need. Specifically, this alternative would:

1. Provide a new bridge that is structurally sound and seismically resistant;
2. Reduce approach grades;
3. Provide sufficient roadway capacity to handle current and future car and truck traffic volumes; and

4. Provide vertical clearance that would afford safe passage of existing container ships and for new-generation vessels currently being constructed.

The North-side Alignment Alternative would affect Port and private properties, including tenant businesses and utilities. It would require demolition of the Port Maintenance Yard and temporary relocation of Fireboat Station No. 20. The North-side Alignment Alternative would result in the conversion of approximately 0.7-acre (0.3-hectare [ha]) of privately held Port- related industrial land to public/transportation use. Privately owned facilities affected include Los Angeles County Flood Control District (LACFCD); LBGS; SCE; Connolly Pacific; and Pacific Energy Resources. Potential effects on these properties could include loss of land due to acquisition, modified access due to bridge footings and easements, and relocation/replacement of utilities and/or facilities. The current estimate for the value of the land for the affected private properties is $2.0 million (see Section 2.1.3.2 [Relocations], for further discussion).

The South-side Alignment Alternative would also achieve the project's purpose and need as discussed under the North-side Alignment Alternative. This alternative would impact primarily Port properties, utilities, and tenant businesses. This alternative would require reconfiguration of both the California United Terminals and Total Terminal International, Inc. (TTI), operations on Piers D, E, and T. The Pier E gate at the California United Terminal facility would require relocation and would include reconfiguration of the following elements: entrance and exit roadways, inbound optical character recognition (OCR) devices, receiving gate lanes with pedestals, scales, cameras and queuing area, the trouble resolution building and parking area, outbound primary radiation portal monitors (RPMs) and OCR devices, outbound secondary RPM, exit gate lanes with pedestals and cameras, and associated underground electrical, communication lines, and pavement markings/barriers. It is estimated that the reconfiguration on Piers D and E would cost approximately $10.0 million. With demolition of the existing bridge, there would be no loss of leasable Port acreage in the Middle Harbor area. Reconfiguration of Pier T would result in the permanent loss of 2.4 acres (1-ha) within the TTI terminal storage facility currently used for refrigerated container storage. Additionally, reconfiguration on Pier T would require modification to the following elements: relocation of a portion of the main gate canopy, driver's service building and trouble parking, steel high mast light poles, chassis storage, and associated utilities, barriers, and pavement markings. It is estimated that the reconfiguration on Pier T would also cost approximately $10.0 million. The estimated present value of 2.4 acres (1-ha) of lost Port lease revenue would be $7.0 million over a typical 20-year lease (see Section 2.1.3.2 [Relocations], for further discussion).

Under the Rehabilitation Alternative, the bridge would survive an extreme seismic event without collapse and loss of life, but it would have a high probability of being condemned and taken out of service. Thus, even with implementation of the retrofit measures in the Rehabilitation Alternative, at an estimated cost of $289.3 million, the bridge seismic performance would not be on par with a new bridge. Furthermore, bridge rehabilitation would not handle future traffic volumes, nor would it provide the vertical clearance needed for safe passage of container ships. Also, a life-cycle cost analysis for the project was completed to evaluate the costs of bridge rehabilitation versus replacement over a 130-year time horizon. The two scenarios evaluated in the life-cycle cost included the following:

A. Build the new bridge now, which would open to traffic in 2015 and have a design life of 100 years. Rehabilitation of the new bridge would take place in 2115, which would extend its service life to 2145.

B. Rehabilitate and seismically retrofit the existing bridge now to meet current AASHTO code requirements with completion in 2015, which would extend its service life to 2045. Replace the rehabilitated bridge in 2045 with a new bridge identical to the one assumed in Scenario A. The new bridge would have a design life of 100 years, thus lasting until 2145.

The results of the life-cycle cost analysis showed that the Bridge Rehabilitation Alternative (Scenario B) has a greater net present value cost ($208 million) than the Bridge Replacement Alternatives (Scenario A).

The No Action Alternative would not meet the purpose and need for the proposed project and would not eliminate the need for rehabilitation or replacement of the Gerald Desmond Bridge. The No Action Alternative would not improve clearance for the safe passage of container ships or handle current or forecasted traffic volumes. Under the No Action Alternative, the bridge would likely be severely damaged during an MCE and would endanger life and property for those using the bridge, ships in the Back Channel, and adjacent Port and private facilities.

1.8.1 Preferred Alternative

After considering all public comments received on the Draft EIR/EA, the potential effects of the project alternatives as described in the Final EIR/EA, and the potential benefits resulting from implementing the project alternatives, the Port and Caltrans have identified the North-side Alignment Alternative as the preferred alternative. The EIR/EA has compared the three Build Alternatives and the No Build Alternative and has concluded: (1) the No Build Alternative does not satisfy the project purpose and need; (2) the North-side and South-side Alignment Alternatives, when compared with the Rehabilitation Alternative, better satisfy the project purpose and need because they better provide for future traffic demand and meet all of the project objectives; (3) the environmental effects associated with the North-side and South-side Alignment Alternatives (both during construction and operation) are reasonably equivalent; and (4) the North-side Alignment Alternative is more cost effective than the South-side Alignment Alternative. Accordingly, the North-side Alignment Alternative has been selected as the preferred alternative for further development.

In accordance with CEQA, the Port has prepared findings for all significant impacts identified and a Statement of Overriding Considerations for impacts that cannot be mitigated to below a level of significance. The Findings and Statement of Overriding Considerations will be forwarded to the BHC for consideration with a recommendation to approve the project and certifying that the environmental document complies with CEQA. Caltrans, as assigned by FHWA, has determined that the NEPA action does not significantly impact the environment, and the Department will issue a FONSI in accordance with NEPA.

Therefore, after comparing and weighing the benefits and impacts of all the feasible alternatives summarized above, the Port and Caltrans have identified the North-side Alignment Alternative as the preferred alternative

1.9 PERMITS AND APPROVALS NEEDED

Table 1-4 lists the permits, reviews, and approvals that would be required for project construction.

**Table 1-4
Permits and Approvals**

Agency	Permit/Approval	Comment
Federal		
FHWA	Air Quality Conformity	
U.S. Coast Guard (USCG)	Bridge Permit (Section 9, Rivers and Harbors Appropriations Act)	
State		
California Department of Fish and Game (CDFG)	California Endangered Species Act (CESA) Incidental Take Permit	Required only if listed bats are present during preconstruction surveys
Caltrans	EA and Project Report Approval Encroachment Permits	
California Coastal Commission (CCC)	Coastal Development Permit	Required only if local Coastal Development Permits are appealed
State Historic Preservation Officer (SHPO)	Consultation; Concurrence under Section 106 (National Historic Preservation Act [NHPA])	
Regional Water Quality Control Board (RWQCB)	Section 402 National Pollutant Discharge Elimination System (NPDES) Permit (Clean Water Act [CWA]) Report of Waste Discharge	
Southern California Association of Governments (SCAG)	Transportation Conformity Working Group ($PM_{2.5}$/ PM_{10}) approval	
State Water Resources Control Board (SWRCB)	Compliance with Statewide NPDES General Permit for Storm Water Discharges Associated with Construction Activity (General Permit), Order No. 99-08-DWQ, NPDES No. CAS000002	
SWRCB	Compliance with Caltrans Statewide NPDES Storm Water Permit, Order No. 99-06-DWQ, NPDES No. CAS000003	
California Department of Conservation – Division of Oil Gas and Geo Thermal Resources (DOGGR)	Approval of plan to relocate, abandon, and/or reabandon oil wells within the construction footprint	
California Public Utilities Commission (CPUC)	Compliance with CPUC General Order 131-D regarding relocation of transmission towers	
Local		
City of Long Beach	Discretionary approvals	
Port of Long Beach	Harbor Development Permit	

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