VOLUME 3
DRAFT ENVIRONMENTAL IMPACT REPORT

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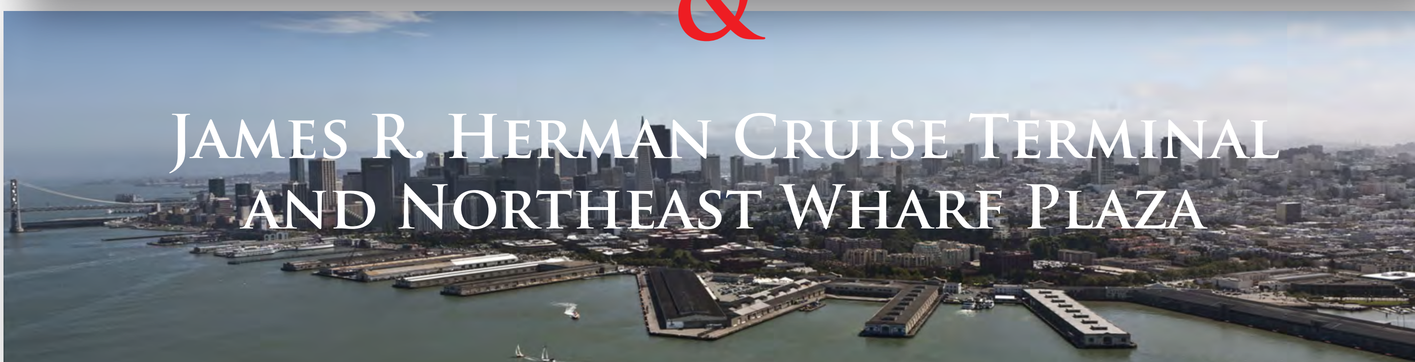

SAN FRANCISCO PLANNING DEPARTMENT CASE NO. 2010.0493E
STATE CLEARINGHOUSE NO. 2011022040

DRAFT EIR PUBLICATION DATE: JULY 11, 2011
DRAFT EIR PUBLIC HEARING DATE: AUGUST 11, 2011
DRAFT EIR PUBLIC COMMENT PERIOD: JULY 11, 2011 – AUGUST 25, 2011

WRITTEN COMMENTS SHOULD BE SENT TO THE
ENVIRONMENTAL REVIEW OFFICER
1650 MISSION STREET, SUITE 400
SAN FRANCISCO, CA 94103

SEAL OF THE CITY AND COUNTY OF SAN FRANCISCO

SAN FRANCISCO
PLANNING
DEPARTMENT

Volume 3
Draft Environmental Impact Report

The 34th America's Cup
&
James R. Herman Cruise Terminal and Northeast Wharf Plaza

San Francisco Planning Department Case No. 2010.0493E
State Clearinghouse No. 2011022040

Draft EIR Publication Date: July 11, 2011
Draft EIR Public Hearing Date: August 11, 2011
Draft EIR Public Comment Period: July 11, 2011 – August 25, 2011

Written comments should be sent to the
Environmental Review Officer
1650 Mission Street, Suite 400
San Francisco, CA 94103

SAN FRANCISCO
PLANNING
DEPARTMENT

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Notice of Preparation

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To Responsible Agencies, Trustee Agencies, and Interested Parties: **February 9, 2011**

RE: CASE NO 2010.0493E: The 34th America's Cup Races and James R. Herman Cruise Terminal and Northeast Wharf Plaza

NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT

NOTICE OF PUBLIC SCOPING MEETINGS

A Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the above-referenced project, described below, has been issued by the San Francisco Planning Department. The NOP/Notice of Public Scoping Meeting is either attached or is available upon request from Joy Navarrete, whom you may reach at (415) 575-9040, voice; (415) 558-6409, fax; joy.navarrete@sfgov.org, email; or at the above address. The NOP is also available online at http://tinyurl.com/meacases. This notice is being sent to you because you have been identified as potentially having an interest in the project or the project area.

Project Description: The 34th America's Cup sailing races are proposed to be held in San Francisco Bay in Summer-Fall 2012, and Summer-Fall 2013. Several of the sites proposed for the America's Cup races are piers, water areas, and facilities managed by the San Francisco Port Commission including: Pier 80, Piers 32-36 water basin, Piers 30-32, Seawall Lot 330, Pier 26, Pier 28, Pier 19, Pier 19½, Pier 23, and Piers 27-29½.

Various spectator activities would occur in locations including China Basin Channel, Herb Caen Way from AT&T Ballpark to Fisherman's Wharf, Aquatic Park, Marina Green, and sites in the Golden Gate National Recreation Area including (but not necessarily limited to) Fort Mason, Crissy Field, Alcatraz Island, Cavallo Point, and Treasure Island. Spectator areas would be managed to protect parklands and sensitive habitats in coordination with and authorization from the agencies having jurisdiction over these areas.

Pier 27 is also the site proposed by the San Francisco Port Commission for the development of the James R. Herman Cruise Terminal and Northeast Wharf Plaza. The cruise terminal project is proposed to be phased to allow initial construction to allow America's Cup Village uses at Pier 27-29 for the 2013 America's Cup races. The proposed improvements to complete the cruise terminal and the Northeast Wharf Plaza at Pier 27 would be built out after the America's Cup races are concluded. The proposed new cruise terminal would be designed to meet modern ship and operational requirements of the cruise industry and to meet LEED-equivalent standards for a maritime facility.

The San Francisco Planning Department has determined that an EIR must be prepared for the proposed project prior to any final decision regarding whether to approve the project. The purpose of the EIR is to provide information about potential significant physical environmental effects of the proposed project, to identify possible ways to minimize the significant effects, and to describe and analyze possible alternatives to the proposed project. Preparation of an NOP or EIR does not indicate a final decision by the City to approve or to disapprove the project. However, prior to making any such decision, the decision makers must review and consider the information contained in the EIR.

The San Francisco Planning Department will hold two **PUBLIC SCOPING MEETINGS** on Wednesday, February 23rd, 2011, at 6:30-8:30 pm at the San Francisco Board of Supervisors Chamber, Room 250, City Hall, 1 Dr. Carlton B. Goodlett Place; and Thursday February 24th, 2011, at

6:30-8:30 pm at the Port of San Francisco, Pier 1, The Embarcadero at Washington Street. The purpose of these meetings is to receive oral comments to assist the San Francisco Planning Department in reviewing the scope and content of the environmental impact analysis and information to be contained in the EIR for the proposed project. Written comments will also be accepted until 5:00 p.m. on **March 11, 2011**. Written comments should be sent to Bill Wycko, San Francisco Planning Department, 1650 Mission Street, Suite 400, San Francisco, CA 94103.

If you work for an agency that is a Responsible or a Trustee Agency, we need to know the views of your agency as to the scope and content of the environmental information that is relevant to your agency's statutory responsibilities in connection with the proposed project. Your agency may need to use the EIR when considering a permit or other approval for this project. We will also need the name of the contact person for your agency. If you have questions concerning environmental review of the proposed project, please contact Joy Navarrete at (415) 575-9040.

Notice of Preparation of an Environmental Impact Report

Date:	February 9, 2011
Case No.:	**2010.0493E**
Project Title:	**The 34th America's Cup Races and James R. Herman Cruise Terminal and Northeast Wharf Plaza**
Locations:	South of Ferry Building: Pier 80, Piers 32-36 water basin, Piers 30-32, Seawall Lot 330, Pier 26, and Pier 28 North of Ferry Building: Piers 19, 23, 27-29½ For various spectator-related and/or temporary berthing activities, locations including China Basin Channel, Herb Caen Way from AT&T Ballpark to Fisherman's Wharf, Aquatic Park, Marina Green, and sites in the Golden Gate National Recreation Area including (but not necessarily limited to) Fort Mason, Crissy Field, Alcatraz Island, Cavallo Point, and Treasure Island.
Zoning:	M-1, M-2, Northeast Waterfront Special Use District and Various
Project Sponsors:	(America's Cup) City and County of San Francisco, America's Cup Event Authority, America's Cup Organizing Committee (Cruise Terminal and Northeast Wharf Plaza) Port of San Francisco
Lead Agency:	San Francisco Planning Department
Staff Contact:	Joy Navarrete – (415) 575-9040 joy.navarrete@sfgov.org

PROJECT DESCRIPTION

INTRODUCTION

On December 31, 2010, the City of San Francisco was chosen as the location to host the 34th America's Cup sailing races. Mayor Gavin Newsom and the San Francisco Board of Supervisors (City) approved a 34th America's Cup Host and Venue Agreement (Host Agreement) with the America's Cup Event Authority (Event Authority) and America's Cup Organizing Committee (ACOC)[1], which approval was subject to review under the California Environmental Quality Act (CEQA) and subsequent city, state and federal approvals of the 34th America's Cup Event (AC34) and associated facilities. Pursuant to provisions of the Host Agreement, the City, Event Authority and ACOC propose improvements and services to several facilities and locations, described below, to support a series of international sailing races in San Francisco Bay that comprise AC34.

[1] Host and Venue Agreement among the City and County of San Francisco, the America's Cup Event Authority, LLC, and the San Francisco America's Cup Organizing Committee. For a copy, please go to: http://www.oewd.org/Development_Projects-Americas_Cup.aspx. The Golden Gate Yacht Club, which holds the America's Cup, delegated to the Event Authority the right to select the venue for AC34. Capitalized, event-related terms used in this document are defined in the Host Agreement.

The America's Cup race events are proposed to take place in Summer-Fall 2013, with one or more preliminary "World Series" races in Summer-Fall 2012. Several of the sites proposed for AC34 are piers and facilities managed by the San Francisco Port Commission. One of these, Pier 27-29, is proposed as part of the America's Cup Village complex. Pier 27 also is the site proposed by the Port Commission for the development of the James R. Herman Cruise Terminal and Northeast Wharf Plaza (Cruise Terminal). The proposed new Cruise Terminal would be designed to meet modern ship and operational requirements of the cruise industry, to meet LEED-equivalent standards for a maritime facility and to provide an appropriate, welcoming gateway to the City for the cruising public.

These elements, in combination, make up the proposed project to be studied in an Environmental Impact Report (EIR), and are described in more detail below. The EIR will analyze the environmental effects of these improvements, which are being planned in phased sequence. The first phase would allow the Event Authority to use Port waterfront property from Pier 80 to Pier 27-29 for purposes of staging AC34 on San Francisco Bay, including the first phase of the Pier 27 cruise terminal. After AC34 is concluded, the second phase would build out the final improvements for the cruise terminal and the Northeast Wharf Plaza at Pier 27.

If Golden Gate Yacht Club (GGYC) wins the 34th America's Cup and the City enters a new Host Agreement with the Event Authority, one or more subsequent America's Cup matches could be staged in San Francisco. Given the speculative nature of such events, the EIR will not analyze future potential America's Cup matches.

The California Environmental Quality Act (CEQA) requires the lead agency with the primary responsibility over the approval of the project to prepare an EIR to assess the potentially significant environmental impacts of the proposed project. Public agencies are charged with the duty to consider and minimize environmental impacts of proposed development, where feasible, and have the obligation to balance economic, environmental, and social factors.

In addition to the provisions for AC34, the Host Agreement provides the Event Authority with certain long-term development rights and directs that any such future development would be required to undergo separate environmental review to comply with CEQA, when site-specific development program details are proposed. Thus, with respect to the AC34, this EIR will focus on the race events and associated race-related waterfront improvements, and will not analyze long-term development possibilities addressed in the Host Agreement at a project level.

PROJECT LOCATION AND SETTING

The AC34 races would require facility improvements, programs and viewing opportunities proposed for numerous sites along the San Francisco waterfront, and at the north end of the Golden Gate Bridge near Sausalito (Cavallo Point), and within the San Francisco Bay (Alcatraz) Figure 1 provides an overview of the proposed sites. Most of the piers and associated facilities affected are under the jurisdiction of the San Francisco Port Commission (Port), described further below. There are other key park and recreation areas under the jurisdiction of other public agencies proposed as locations to support 2012 race events, and/or major spectator venues for races in both 2012 and 2013. See Figures 2-5 for an overview of the proposed AC34 uses for the race events in 2012 and 2013.

Fort Mason, Crissy Field, Cavallo Point, and Alcatraz Island, are all located within the Golden Gate National Recreation Area (GGNRA); Aquatic Park is located in the San Francisco Maritime National Historic Park (SAFR); and all are under the jurisdiction of the National Park Service. The paved portion of Crissy Field west of the tidal marsh is under the jurisdiction of the Presidio Trust. Together they provide a broad array of public beaches and open space for diverse recreational activities on land and in the water, manage valuable environment and habitat resources, and preserve and rehabilitate historic resources for public benefit.

- Aquatic Park is located at the west end of Fisherman's Wharf, starting west of Hyde Street and extending to Fort Mason just west of Van Ness Avenue. The National Park Service Pacific West Information Center is currently located in the SAFR visitor center on the corner of Hyde and Jefferson Streets. Aquatic Park Historic District is a National Historic Landmark and is listed on the National Register of Historic Places. It includes a beach, concrete stadia, grassy lawns and the horseshoe-shaped Municipal Pier extending into the Bay. It connects to Fort Mason, a former U.S. Army post and another National Register listed district that includes Lower Fort Mason, aka the San Francisco Port of Embarkation, another National Historic Landmark. The SAFR headquarters is located at Building E in Fort Mason Center, and GGNRA's headquarters is located in Building 201 in Upper Fort Mason. Within Fort Mason, there are many historic buildings, public open spaces, and the Fort Mason Center which include piers and warehouses, which host a variety of environmental, cultural and arts organizations.
- Crissy Field is a former U.S. Presidio Army Base Airfield, which underwent a major habitat restoration transformation that included converting 22 acres into a tidal marsh. There are over 1,000 paved and unpaved parking spaces in the Presidio Areas A and B, including Crissy Field.
- Alcatraz Island, a former Civil War outpost and later an infamous federal prison, which is currently a major museum exhibit attraction located offshore of Fisherman's Wharf is accessible only by ferry operators under contract with the National Park Service.
- Cavallo Point is located at the base of the north end of the Golden Gate Bridge, in the Marin Headlands, occupying a section of the Fort Baker Historic District. Historic buildings at Cavallo Point have recently been rehabilitated to house the Cavallo Point Lodge.
- Marina Green is a public park under the jurisdiction of the San Francisco Recreation and Parks Department, located in San Francisco's Marina district, north of Marina Boulevard between Fort Mason on the east, and the San Francisco Marina and St. Francis Yacht Club on the west. Marina Green includes an approximately 5.6-acre open grass field, encircled by wide, paved sidewalks on all sides and parking areas to the north, south and west.

NOP-8

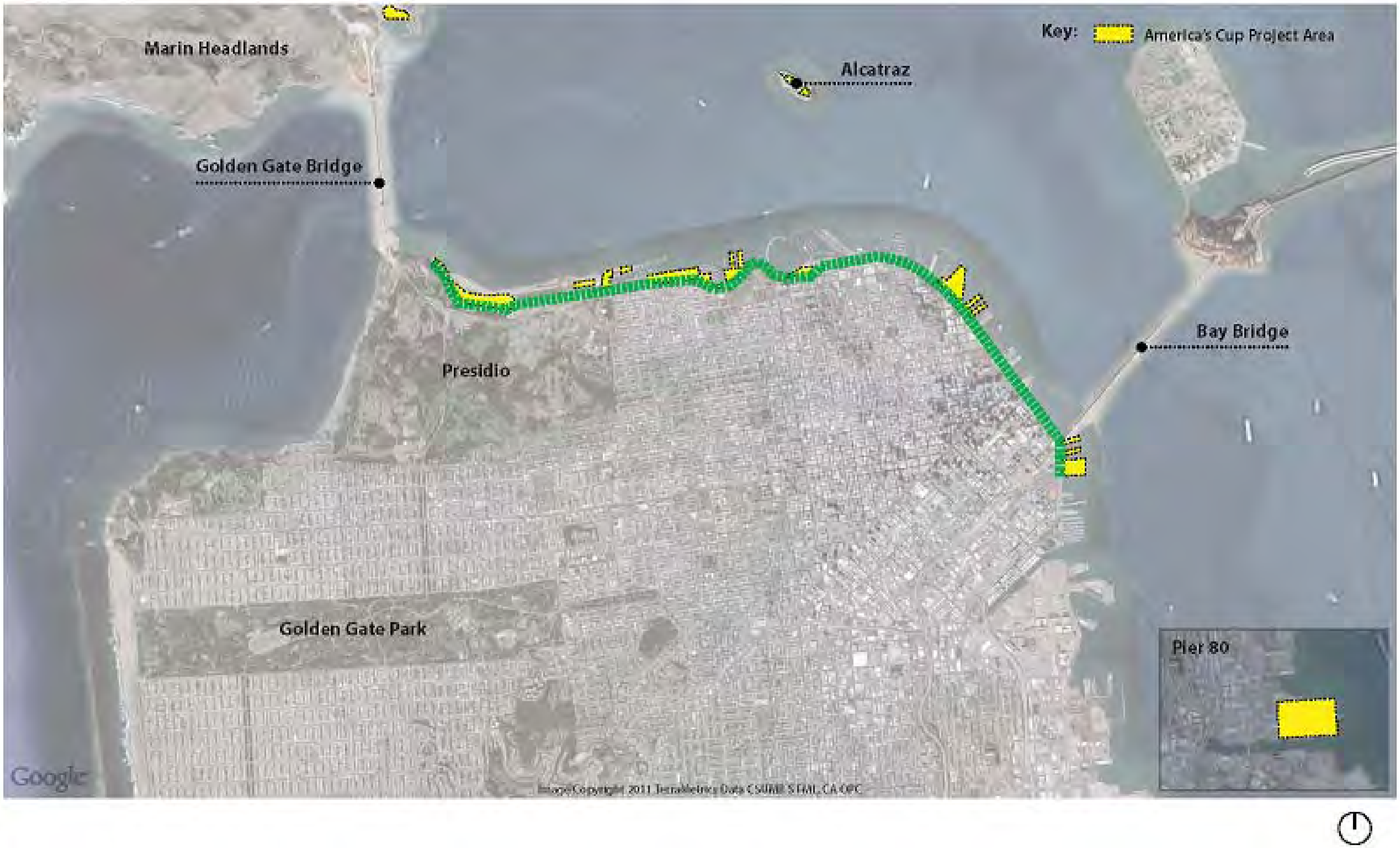

Figure 1 – Project Location Map
Source: AECOM, February 2011

NOP-9

Figure 2 – 2012 Proposed Race Event Uses
Source: AECOM, February 2011

Figure 3 – 2013 Proposed Race Event Uses
Source: AECOM, February 2011

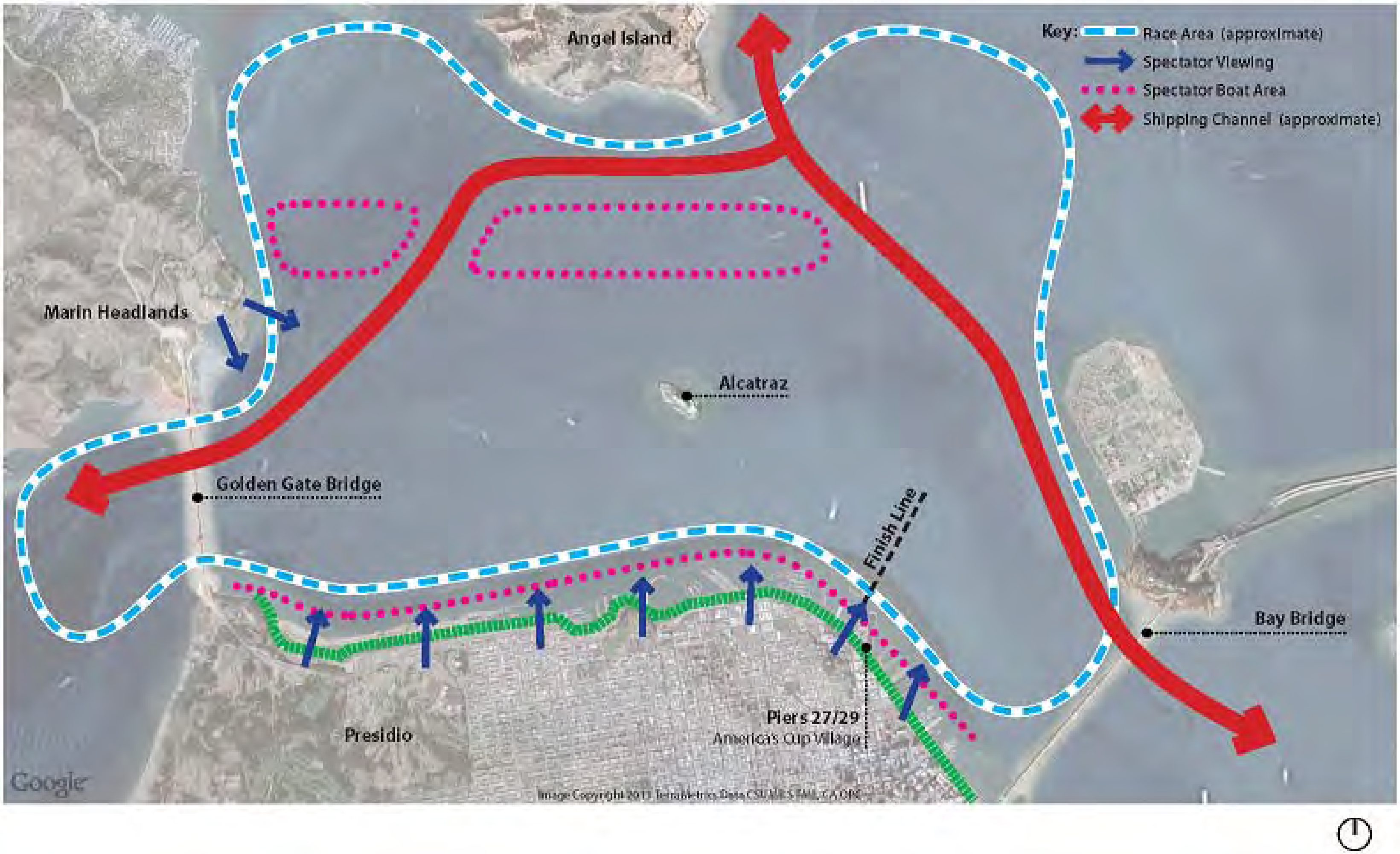

Figure 4 – Proposed Sailing Race Area
Source: AECOM, February 2011

NOP-12

Figure 5 – Proposed Northern Waterfront Spectator Areas
Source: AECOM, February 2011

For this EIR, the National Park Service (NPS) is considered a Responsible Agency under CEQA. As a Federal Agency with discretionary approval authority over a portion of this project, the NPS will adopt the EIR and conduct appropriate National Environmental Policy Act (NEPA) analysis as it considers use of their lands for this event. There may be other public areas where spectators may be expected to congregate to watch AC34 races. The EIR will provide information about those areas and will analyze all potential impacts associated with public viewing activities at those sites.

All but one of the affected Port facilities is located north of China Basin Channel, as shown in Figure 3. The only Port facility proposed for AC34 use in the area designated as the Port's southern waterfront is Pier 80, located on the north side of Islais Creek at the foot of Cesar Chavez Street, adjacent to the Potrero Hill/Dogpatch and Bayview Hunters Point neighborhoods. Pier 80 is one of the Port's primary cargo terminals, a 69-acre facility, operated by Metropolitan Stevedore Company dba Metro Ports. Pier 80 handles multiple types of breakbulk and project cargoes, and includes on-deck and enclosed warehouse storage. See Figure 6.

The other proposed piers and property north of Pier 80 (from south to north) and current uses as of January 2011 are described below:

Pier 30-32 and Seawall Lot (SWL) 330 (see Figure 7) is located in the South Beach/Rincon Hill neighborhood, near the intersection of Bryant and The Embarcadero. Pier 30-32 is an approximately 13-acre facility, which has no on-deck structures, except for Red's Java House, a restaurant occupying a small historic structure which is a contributing resource in the Embarcadero Waterfront Historic District. Pier 30-32 is used for off-street parking, managed by parking operator, and occasional special events. The facility is in deteriorating structural condition, which precludes industrial truck access. SWL 330 is an approximately two-acre paved, inland site, located across The Embarcadero from Pier 30-32. It is operated as a parking lot, managed by a parking operator.

The Piers 32-36 water basin is located immediately south of Pier 30-32, along The Embarcadero between Delancey Street and Beale Street. The area is designated as an Open Water Basin in the Port's *Waterfront Land Use Plan* (WLUP) and the San Francisco Bay Conservation and Development Commission's (BCDC) *Special Area Plan for the San Francisco Waterfront* (Special Area Plan) fronting the planned Brannan Street Wharf public open space.[2]

Pier 28 (see Figure 7) is located immediately north of Pier 30-32, a 100,000-square-foot facility with 80,000 square feet of space within a pier shed. Pier 28 is a contributing resource in the Embarcadero Waterfront Historic District. There are 15 leases for space in Pier 28 for warehouse storage, office and parking uses.

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2 The Brannan Street Wharf also is designated in Port and BCDC plans as a major, strategic public open space. The Port is working jointly with the U.S. Army Corps of Engineers to design and construct this project, which is undergoing separate, concurrent environmental review and permitting. The Brannan Street Wharf Draft EIR (Case File 2009.0418E) is scheduled to be published for public comment in February 2011. Chelsea Fordham is the EIR Coordinator for this project at the San Francisco Planning Department, Chelsea.Fordham@sfgov.org.

NOP-14

Figure 6 – Proposed Pier 80 Venue Program
Source: AECOM, February 2011

NOP-15

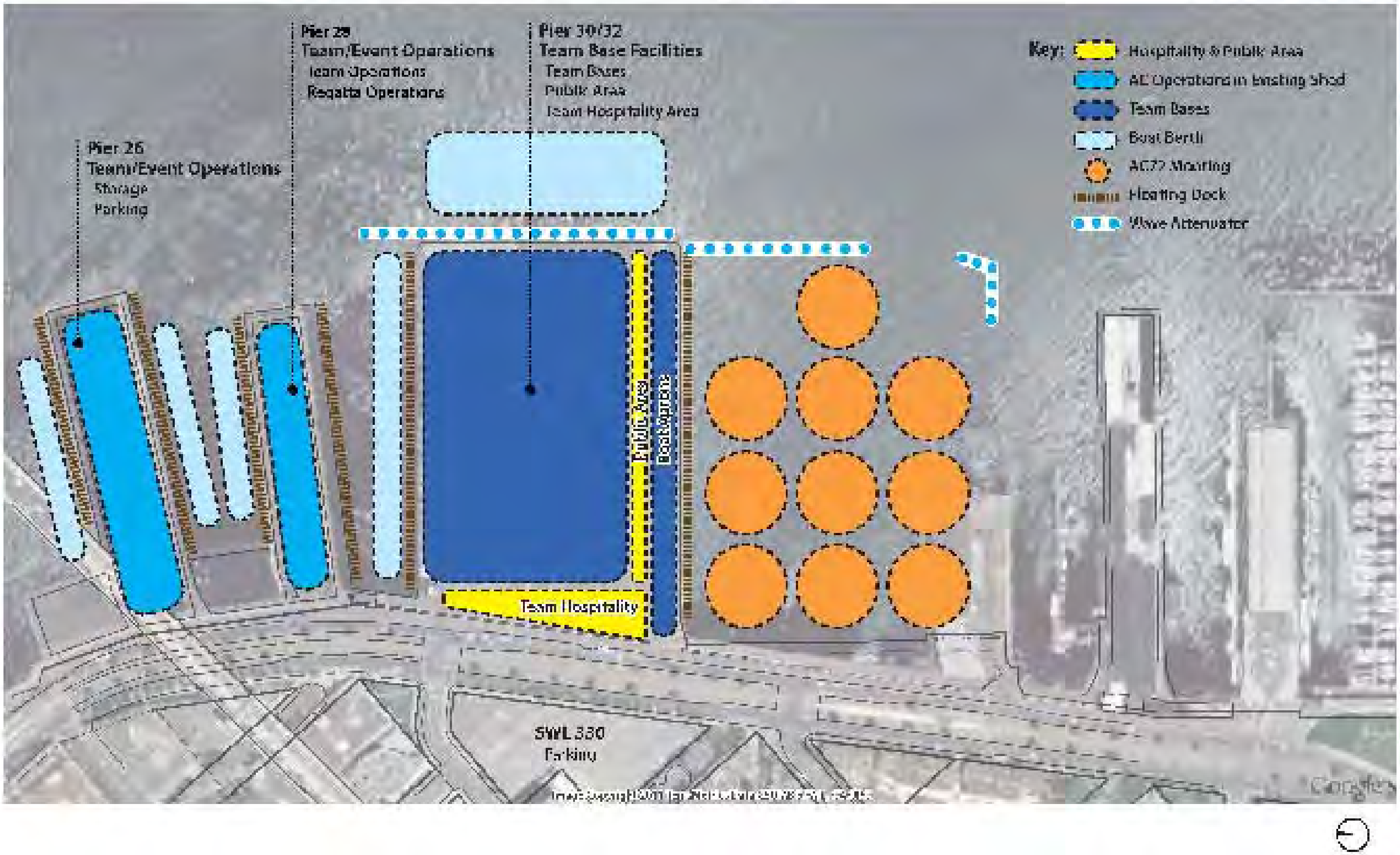

Figure 7 – Proposed Piers 26-32 Venue Program
Source: AECOM, February 2011

NOP-16

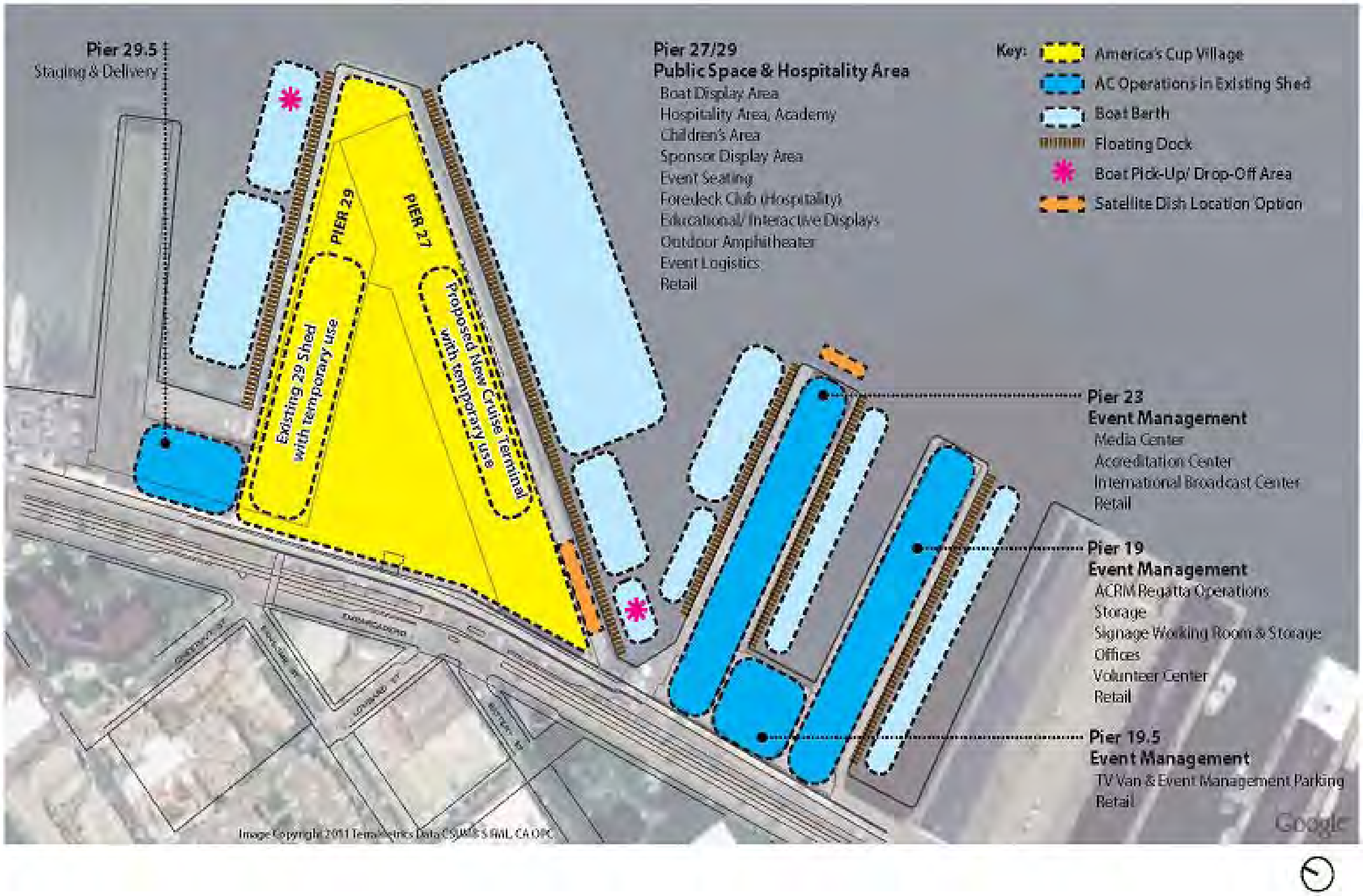

Figure 8 – Proposed Piers 19-29 Venue Program
Source: AECOM, February 2011

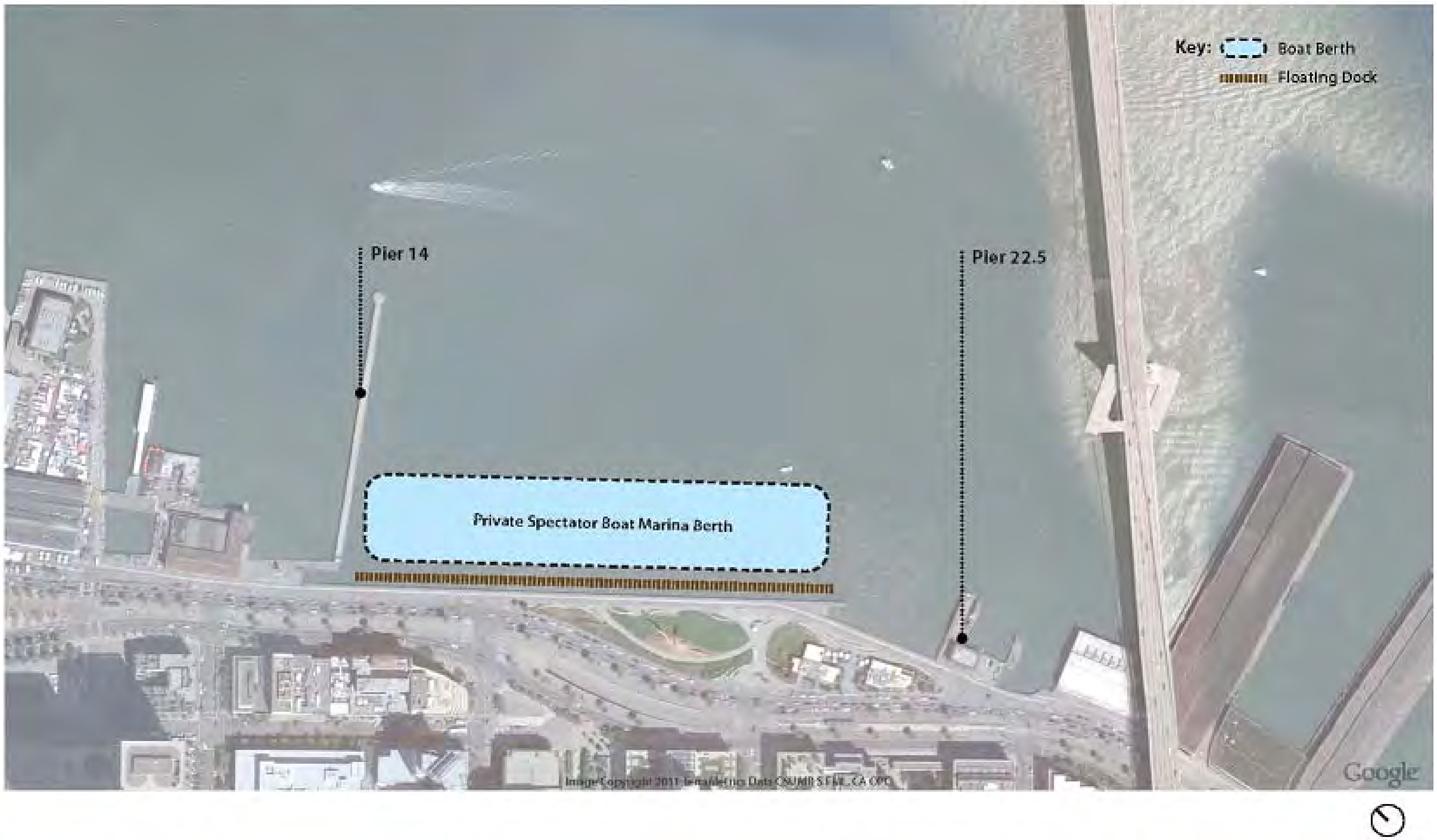

Figure 9 – Proposed Piers 14-22 ½ Venue Program
Source: AECOM, February 2011

Pier 26 (see Figure 7) is located immediately north of Pier 28, along The Embarcadero, under the San Francisco-Oakland Bay Bridge. Pier 26 is a contributing resource in the Embarcadero Waterfront Historic District. There are 21 leases for space in Pier 26 for warehouse storage (including commercial fishing equipment), office and parking uses.

Piers 19 and 23 (see Figure 8) are located north of the Ferry Building, in the northeast waterfront, near the intersection of Front Street and The Embarcadero. Each of the two piers and associated pier sheds are contributing resources in the Embarcadero Waterfront Historic District. They are joined by a non-historic shed building, Pier 19½, which runs parallel to The Embarcadero. There are 28 leases for space in Piers 19-23, mostly for warehouse purposes with ancillary parking, with parking in Pier 19½ and office in Pier 23.

Pier 27-29 (see Figure 8) is a 14.8 acre, triangular shaped, pile-supported pier located adjacent to the intersection of The Embarcadero and Lombard Street. It is the project site for the proposed James R. Herman Cruise Terminal and Northeast Wharf Plaza and AC34 race events. Pier 27 is the largest pier in the northern half of the Port waterfront, and includes the longest functional wharf face for vessel berthing, approximately 1,300 feet long with an apron width of 48 feet.

Pier 27 has been in continuous maritime usage for berthing deep-draft vessels, previously supporting cargo ship, military, and government research vessel berthing. Pier 27 is an important secondary berth for passenger cruise ships in addition to berthing for military, large research vessels and ceremonial ships. The berth at Pier 27 is maintained at a depth of -35 ft mean lower low water (MLLW) under the Port's fully permitted maintenance dredging program. Adjacent to Pier 27, the Pier 23-27 basin is designated as an Open Water Basin fronting the planned Northeast Wharf Plaza in the Port's WLUP and the BCDC Special Area Plan.

In 1967, the Port undertook major construction to build a new, pile-supported platform and 220,000-square-foot cargo shed along a new axis that created the pier's current triangular shape, replacing the former Pier 27 deck and cargo shed. This Pier 27 construction terminated at the eastern end by connecting with Pier 29. This construction included a new substructure and seismic engineering that strengthened the stability of the entire combined facility, including historic Pier 29, built in 1915. The work required the eastern end of the Pier 29 cargo shed and associated deck to be removed or altered. The Pier 29 shed and associated bulkhead that fronts on The Embarcadero contains approximately 119,000 square feet of warehouse space. Pier 29 is a contributing historic resource in the Embarcadero Waterfront Historic District. Pier 27 is a non-contributing resource but located within the Historic District boundaries.

Together, the Pier 27 and 29 sheds line the entire outboard perimeter of the pier facility. This creates an approximately 170,000-square-foot triangular open "valley" in the middle of the pier. Along the western edge of Pier 27-29, fronting The Embarcadero, there are two small ancillary structures: the approximately 12,000-square-foot Pier 27 Annex office building, and the Pier 29 Beltline office building, which is designated as a contributing resource in the Embarcadero Waterfront Historic District. These two buildings are leased to multiple tenants for office use.

Current uses at Pier 27-29 are varied. Approximately 25 percent of the Pier 27 shed is currently leased and supports preparations for San Francisco's Chinese New Year Parade and a transportation services company. The remainder is used for parking operated under a Port parking management agreement. The parking operator vacates the area to allow the Port to accommodate back-up cruise terminal berthing when there are multiple cruise ship calls in San Francisco and the existing Pier 35 cruise terminal is fully utilized. In 2010, in partnership with the San Francisco Bay Area Air Quality Management District, the Port completed installation at Pier 27-29 of a shoreside power system for cruise ships. The shoreside power system enables cruise ships to plug into the City's electrical grid while in port, instead of relying on the vessel's diesel generators for power, thereby significantly reducing diesel emissions. Pursuant to State regulation, the Port has scheduled all shoreside-power-capable cruise ships to be berthed at Pier 27 beginning in 2011. The Port expects 20 to 22 cruise ships to use Pier 27 in the 2011 cruise season.

There are 12 leases in Pier 29 and Pier 29½ with warehouse and parking tenants. As part of the shoreside power project, the electrical utilities within the Pier 29 shed were improved. The Pier 27-29 valley is leased for parking, an artificial turf soccer field, and the Teatro Zinzanni dinner and entertainment club, which is housed in a tenant-owned tent structure, plus other ancillary support structures. The Pier 27 Annex office building and the Historic Belt Line Rail Building are currently leased to office tenants.

MAJOR PROJECT COMPONENTS

The components of the proposed AC34 race events and Pier 27 cruise terminal/Northeast Wharf Plaza improvements would use the project site locations in varying ways over time. As described below, these components would be phased, beginning with demolition of some existing structures on Pier 27 and construction of the core and shell of a new cruise terminal building. The AC34 race events would occur first, with construction activities to prepare various sites prior to 2013, followed by the completion of the Pier 27 cruise terminal and plaza improvements after conclusion of the race events. The proposed improvements presented below focus first on AC34 improvements. Many of the proposed improvements would be temporary, to be in place only for the duration of the race activities, after which time they would be removed. These installations would differ between the 2012 and 2013 race events. Some facilities would undergo permanent improvements that would remain after conclusion of race events, including significant improvements to Piers 30-32 and the construction of the Pier 27 cruise terminal to a level of improvement commonly referred to as "cold shell." The project description information below is therefore presented in these different timeframes.

America's Cup Races

The America's Cup races encompass a multi-year circuit of "World Series" regattas and sailing competitions starting in 2011 in cities around the world, progressively building up to the World Series races proposed in San Francisco Bay in 2012. The World Series races would be followed in 2013 by Challenger Selection Series (CSS) races, where teams compete to determine which would race in the final America's Cup Match against the Defender. The Host City Agreement allows for the Golden Gate Yacht Club to schedule Defender Selection Series races around the CSS races in 2013, at their option. Whereas past America's Cup races have been held in open ocean waters away from population areas, staging the AC34 races in San Francisco Bay would enable throngs of spectators to view the races from the surrounding shore.

The proposed San Francisco Bay race areas are depicted in Figure 4. While details are subject to change, the proposed race area within which the races would occur would cover an area generally bounded by the San Francisco waterfront on the west, Bay waters beyond the Golden Gate Bridge to the north, Alcatraz Island, Treasure Island and Angel Island on the east, and Bay Bridge at the south. The race finish is proposed in the waters off Pier 27-29. It is expected that races would be completed in approximately 1-1.5 hours. During each race, and for a period before and after, restrictions on maritime traffic and airspace would be required. Detailed consultation with the U.S. Coast Guard and Federal Aviation Administration would be required, and thus the race area details are subject to change. For the 2012 and 2013 races in San Francisco, the teams would use AC72 catamarans which are 72 feet long, 45 feet wide, with a mast height of 130 feet, and have a draft of approximately 14 feet.

While the races are the focal event of all America's Cup activities, AC34 would include a full program of exhibits, entertainment, commercial attractions and services that surround the entire experience. The hub of these activities would take place in the America's Cup Village. The Event Authority is in charge of creating the AC Village. Table 1 outlines a typical day of programs and events envisioned on AC34 race days at the America's Cup Village. These activities and timelines are provided as examples only and would be subject to change as plans for the AC34 develop and evolve.

The races and America's Cup Village events would be major attractions for local and Bay Area residents, and visitors from around the world. The Event Authority has preliminary visitor projections that the America's Cup Village could attract 50,000 to 100,000 visitors over the course of a weekend or final race event day, and slightly lower projections for weekday race event days. Preliminary projections for visitors attracted to The Embarcadero waterfront, and designated spectator areas managed by the Event Authority would range from 100,000-250,000 on weekday race event days, to 250,000 – 500,000 on weekend and final race event days. Spectators also would be drawn to other public shoreline areas with views of the race course area, including the Golden Gate Bridge, Treasure Island, Angel Island, areas in Marin County, and other lands within the GGNRA and SAFR.

The event would include licensing for a variety of temporary retail sites, distributed at locations on Herb Caen Way from AT&T Ballpark to Fisherman's Wharf, to serve visitor retail demand and provide managed sites for composting and recycling, with security services to discourage non-permitted and unlicensed commercial activities.

Table 1: Typical Activity Program at America's Cup **Village on 34th America's Cup Race Days**
(subject to revision)

9:30 am	**America's Cup Village opens**
10:00 – 11:00	**Live Entertainment on stage; boat activities/animations**
11:00 – 12:00	**"The America's Cup Dock-out Show"** • Introduction of all teams via presenter and giant screens • Crew getting the catamarans ready • Boat parade to the race course • Interviews, games, interaction (e.g. lucky winners of sweep stakes would board chase boat to go out to race course)
12:00 pm	**Event Live Site open**
1:00 – 5:00	**Racing** • Live commentary, interviews and animations to the broadcast of racing on the giant screens in Village and at Event Live sites • Visitors on grand stands following the racing at America's Cup Village and at Live Sites
5:00 – 8:00	**After Race Show** • AC72 return to Event Village • Press Conferences, TV Interviews • Music, demonstrations
8:00 – 12:00 am	**Event Action and Entertainment**
12:00 am	**America's Cup Village closes**

The 2012 America's Cup World Series Races

In San Francisco, one or two "World Series" Pre-regatta(s) would occur in 2012, currently scheduled for July, August and September. Each World Series event would run for nine days, from Saturday of one weekend, through Sunday of the following weekend. There would be multiple races per day, with fleet racing on the final Sunday. Subject to scheduling changes, races would occur on eight days, with one non-race day. The EIR will assume two AC34 World Series events. The World Series would have a circuit winner, but the outcomes of the World Series would not affect the Challenger Selection Series or the America's Cup Match in 2013.

The venue sites for the 2012 races would be limited in number, because there would be insufficient time to improve and/or construct facilities before that time. Figure 2 provides a site overview of the locations to be programmed by the Event Authority and ACOC for assembly, hospitality and spectator areas. There would be no permanent installations or construction for the 2012 races; all installations would be removed after the 2012 races, except at Pier 80. Pier 80 would be the location of team bases if improvements for team bases at Piers 30-32 were not completed in 2012. Table 2 below identifies the project components that will be assumed in the EIR, associated with the 2012 World Series Events, by location.

Table 2: 2012 Event – America's Cup World Series Project Components

Project Area	Temporary Project Components
Pier 80	• Team bases for up to 12 teams, including boat work, storage and maintenance, office space in temporary structures (up to 40 feet), and team catering facilities; • Boat lifts (mobile cranes); • A 200 foot floating dock; and • A 750 foot floating dock.
Barge Helipad& Regional Airports	Floating barge for purposes of refueling helicopters that serve broadcasting and media operations, with overnight landing and storage at regional airports.
America's Cup **Village: Marina Green**	• One or more tents housing: o AC 34 Operations Center(offices, media center, volunteers room, storage); and o Hospitality area for corporate and private functions, estimated workers/visitors: 500-2,000; • Public and corporate entertainment/spectator area, food and beverage, retail, interactive displays, info booths, branding and advertising: 50,000-100,000 square feet;

Table 2: 2012 Event – America's Cup World Series Project Components	
Project Area	**Temporary Project Components**
	• Bleachers for public viewing, estimated workers/visitors: 5,000-10,000; • Approximately 1,000 linear feet of temporary floating boat slips for tender boats and race official boats with retaining pilings and gangways, anchored using piles, gravity anchors or screw anchors; • Ancillary on and off-street parking
Spectator Areas	*Aquatic Park* • Possible mooring for USA 17 and AC 45 race boats • Possible corporate identity, concession stands, and viewing areas *Alcatraz* • Hospitality area for corporate and private functions, estimated workers/visitors: 500-2,000 • Viewing area (bleachers) for 500-2,000 • Satellite dish(es)for television signal transmission *Crissy Field, Cavallo Point, Fort Mason* • Hospitality area for corporate and private functions, estimated 500-2,000 workers/visitors • Public and corporate entertainment/spectators with food and beverage, retail, interactive displays, info booths, estimated workers/visitors: 50,000-100,000 • Bleachers for public viewing for 5,000-10,000 • Berthing for up to 15 large spectator vessels with a draft of up to 21 feet (likely at Fort Mason) • International Broadcast Center • Television studio *AC34 Live Sites* • Public viewing locations at Union Square, The Embarcadero, Justin Herman Plaza and other locations in San Francisco to be determined, where the public can watch races on large outdoor television screens.

The 2013 America's Cup Challenger Series and Match Races

In 2013, there would be a "Challenger Selection Series" (CSS) to determine the winner of the Louis Vuitton Cup, where the teams compete in several rounds of races, until the winner advances to compete against the GGYC team, the Defender, in the AC34 Match. Table 3 provides a summary of how the CSS races start with a round robin competition, advancing through quarter and semi-finals, and up to the final CSS race, the Louis Vuitton Cup. The overall timeframe for the CSS races would be approximately 45 days, from about mid-July to early September. Races would not occur every day. Table 3 provides a possible schedule of the race days which would occur over three- or four-day weekends; these schedules are illustrative and dates would be subject to further change although would maintain the overall 45 day event period.

The Host Agreement provides for possible "Defender Selection Series" (DSS) races, which GGYC could sponsor, at their option. If such DSS races occurred, they would be scheduled during non-race days or at different hours between the CSS races.

Racing would culminate with the 34th America's Cup Match (Match) between the Defender and the winner of the Louis Vuitton Cup, a best of nine Matches, currently planned from September 7th to September 22nd, 2013, drawing the most substantial spectator crowds to the Event.

The improvements proposed for the 2013 race events would involve substantial capital investment and construction for some facilities, which would undergo permanent upgrades that would stay in place after AC34, and temporary improvements that are removed after the AC34 concludes.

Pier 27-29 is proposed as the America's Cup Village in 2013, the hub of hospitality, entertainment and spectator viewing of the sailing races. The improvements required to support this use would be coordinated with the phased development of the cruise terminal. AC34 would start with demolition of Pier 27 shed in its entirety, and a portion of the Pier 29 shed, to create an expansive public viewing platform at the eastern end of Pier 27-29 to accommodate up to 10,000 spectators. Then, the cruise terminal building shell would be constructed for AC34 team hospitality suites and associated uses. After the conclusion of the AC34 race events, the Port would follow with further construction and improvements to complete the cruise terminal and public plaza.

Table 3: 2013 Race Event – The Louis Vuitton Cup – Challenger Selection Series (CSS) Conceptual Race Schedule (subject to revision)

	Round Robin	**Quarter Finals**	**Semi Finals**	**Challenger Finals**
Format assumptions		Best of Three	Best of Five	Best of Seven
Number of races (from – to)	45	(8-12)	(6-10)	(4-7)
Number of races per day	3	3	3	1
Duration of one race	45 min	45 min	45 min	60 min
Time of racing each race day	From 1pm to 5pm			
Number of race days (min – max)	15	(3-4)	(2-4)	(4-7)
Possible Race Schedule	July 13, Sat	Aug 8, Thu	Aug 16, Fri	Aug 23, Fri
	July 14, Sun	Aug 9, Fri	Aug 17, Sat	Aug 24, Sat
	July 15, Mon	Aug 10, Sat	Aug 18, Sun	Aug 25, Sun
	July 19, Fri	Aug 11, Sun	Aug 19, Mon	Aug 29, Thu
	July 20, Sat			Aug 30, Fri
	July 21, Sun			Aug 31, Sat
	July 24, Wed			Sep 1, Sun
	July 25, Thu			
	July 26, Fri			
	July 27, Sat			
	July 28, Sun			
	Aug 1, Thu			
	Aug 2, Fri			
	Aug 3, Sat			
	Aug 4, Sun			

Note:
1) This concept schedule assumes 10 teams participating
2) Races for the Defender Selection Series, if required, would be programmed around the dates for the CSS (same time period, same course)

The 2013 analysis assumes the completion of the Brannan Street Wharf public open space, located immediately south of Pier 30-32 in the South Beach/Rincon Park neighborhood. Brannan Street Wharf would provide public access and viewing of AC34 team bases and moored racing yachts. The Brannan Street Wharf is the subject of a separate EIR process currently underway. The Draft EIR will be published and available for public comment in February 2011; the Final EIR is expected to be completed in summer 2011.

Table 4 below identifies the project components that would be associated with the 2013 Challenger Selection Series and America's Cup Match Events, by location.

Table 4: 2013 America's Cup Challenger Series and Match Project Components

Project Area	Temporary Project Components	Permanent Project Components
Pier 80	Ancillary team base support. See Table 2 for description of 2012 uses and improvements.	
Pier 32-36 Open Water Basin	Temporary floating wave attenuators along the east end of Pier 30/32 and extending north 100 feet and south 1400 feet in one or more sections, anchored using piles, gravity anchors or screw anchors. Temporary mooring for AC72 racing yachts, anchored to concrete blocks on the Bay floor.	Dredge to a depth of 16.5 feet the approximate triangular area between the southeast corner of Pier 32, proceeding south to the intersection of a line extending east from the southeast corner of Pier 36 and then proceeding northwest to a point on the southwesterly corner of Pier 32.
Brannan Street Wharf	Race yacht viewing.	None.
Piers 30-32	Improvements to provide up to 10 team bases, for boat working and maintenance, deliveries, storage and ancillary team parking, and controlled public access. Temporary uses and related improvements proposed to support AC34 events at Pier 30-32 would include: • Temporary structures including areas for boat lift, boat maintenance, boat storage, offices, and support spaces; • Boat lifts for lifting racing yachts in and out of the water; • Team hospitality; • 850 linear feet of temporary floating boat slips on both the south and north face of Piers 30-32 with retaining pilings and gangways from pier deck. The floating docks would be anchored using piles, gravity anchors or screw anchors; • Controlled public access to active boat launch and work areas on the pier to protect public safety.	Seismically upgrade and repair Pier 30-32 in 2012 to support full public access and team base operations, which would include: • Installing large diameter steel piles and pile caps at numerous locations tied to the structure and/or constructing shear panels which would involve driving smaller diameter piles, with connecting steel or concrete panels, to increase lateral capacity; • Removing spalled concrete on deck and soffit, and replace with new concrete patch; • Removing rusted and broken reinforcing steel and replace with new reinforcing steel; • Replacing portions of deck and piles as needed; • Installing a structure to raise the depressed valley between Piers 30 and 32; • Installing stormwater management

Table 4: 2013 America's Cup Challenger Series and Match Project Components		
Project Area	**Temporary Project Components**	**Permanent Project Components**
		features, consistent with the San Francisco Stormwater Management Guidelines.
Seawall Lot 330	Parking spaces (up to the current capacity of the lot) for team staff and the public.	None.
Piers 26 and 28	Uses would include storage, parking, and regatta and team operations. Either Pier 26 or Pier 28 could be dedicated exclusively to parking use for workers of team support staff working at Piers 30-32, and signage and traffic management improvements necessary to minimize vehicle/pedestrian conflicts along Herb Caen Way.	Improvements to meet fire safety and exiting requirements, consistent with Secretary's Standards.
Pier 19 and 19½	Temporary structures/installations, consistent with Secretary's Standards for: • Regatta operations; • Event storage; • Temporary cafeteria for AC34 staff, media and volunteers; • Volunteer center; • Retail, exhibition and merchandising area; • Truck loading and delivery zone in bulkhead; and • Ancillary office and parking.	Optional improvements including build out of a new north bulkhead wall between Pier 19 and Pier 19½, ADA-accessible ancillary bulkhead office space, a seismic joint between the bulkhead and pier, marginal wharf and pile repairs, and fire safety and access improvements, complying with Secretary's Standards.
Pier 23	Temporary structures/installations, consistent with Secretary's Standards: • Media center; • International Broadcast Center; • TV production and studios; • Staff, media and volunteer credential center; • Retail, exhibition and merchandising area; • Truck loading and delivery zone; • Approximately 4,000-square-foot barge set on piles at the east end of Pier 23 for up to 10 satellite dishes; and	Optional improvements including build out of ADA-accessible ancillary bulkhead office space, a seismic joint between the bulkhead and pier, marginal wharf and pile repairs, and fire safety and access improvements, complying with Secretary's Standards.

Table 4: 2013 America's Cup Challenger Series and Match Project Components		
Project Area	**Temporary Project Components**	**Permanent Project Components**
	• Approximately 200-square-foot temporary broadcast booth on the Pier 23 apron.	
Piers 27-29 and Pier 29½	America's Cup Village, which may draw approximately 25,000-50,000 visitors per day, including up to 600 workers. Access to Pier 27-29, both vehicular and pedestrian, would be controlled. Temporary uses and related improvements for AC Village would include: • Food and beverage, and hospitality in the Pier 27 terminal building; • Outdoor amphitheater and event seating; • VIP hospitality area; • Boat display area; • AC34 interactive displays; • Children's area; • Sponsor display areas; • Food and beverage vendors; • Retail, exhibition and merchandising area; and • Pier 29½ – Event staging/back of house.	Improvements would include: • Demolishing Pier 27 shed and a portion of Pier 29 shed, and construct Pier 29 new east and corner wall, consistent with Secretary of Interior's Standards for the Treatment of Historic Properties (Secretary's Standards) • Constructing Pier 27 Cruise Terminal core and shell building, including required utilities; • Repairing surface and provide ADA access; • Strengthening and seismically upgrading the Pier 29 superstructure, if needed; • Repairing Pier 29 apron and fendering, if needed; • Relocating shoreside power; • Installing stormwater management features consistent with San Francisco Stormwater Design Standards; and • Repairing Pier 29 marginal wharf, and repair Piers 27-29 substructure, if needed.
Barge Helipad & Regional Airports	Floating barge for purposes of refueling helicopters that serve broadcasting and media operations, with overnight landing and storage at regional airports.	None
Water Areas:	Distributed berthing for private spectator boats, race support boats, tender boats and media boats, including temporary floating docks, and/or gangways anchored by pilings,	Possible apron repairs at one or more of these locations.

Table 4: 2013 America's Cup Challenger Series and Match Project Components		
Project Area	**Temporary Project Components**	**Permanent Project Components**
	gravity anchors or screw anchors at one or more of the following locations, subject to consent from Port tenants where required (estimated number of vessels shown in parenthesis): • Pier 48 south and China Basin (between Pier 48 and AT&T Ballpark) (0-5) • Pier 1 (0-5) • Pier 9-15 water basin (0-5) • Piers 17-19 water basin (0-5) • Piers 23-27 water basin (0-100) • Pier 29-31 water basin (0-15) • Piers 26-28 water areas (0-60) • Piers 41-45 water basin (0-5) • Fort Mason (0-10)	
Spectator Areas	**Alcatraz** • Hospitality area for corporate and private functions, including food and beverage, Workers/visitors: 500-2,000 • Viewing area (bleachers)500-2,000 • Midpoint for television signal **Crissy Field, Alcatraz, Cavallo Point, Fort Mason** • Hospitality areas for corporate and private functions, including food and beverage. Workers/visitors: 500-2,000 • Public and Corporate entertainment/spectators with food and beverage, retail, interactive displays, info booths Workers/visitors: 50,000-100,000 • Bleachers for public viewing Workers/visitors: 5000-10,000 • International Broadcast Center • Television studio	None

Table 4: 2013 America's Cup Challenger Series and Match Project Components		
Project Area	**Temporary Project Components**	**Permanent Project Components**
	Aquatic Park • Possible mooring for USA 17and AC 45 race boats • Potential for corporate identity, concession stands, and viewing areas **Marina Green** • Hospitality area for corporate and private functions, including food and beverage. Workers/visitors: 500-2,000 • Public and corporate entertainment/spectator area, food and beverage, retail, interactive displays, information booths. Workers/visitors,: 50,000-100,000 • Bleachers for public viewing, workers/visitors: 5,000-10,000 **AC34 Live Sites** • Public viewing locations at Union Square, The Embarcadero, Civic Center Plaza, Justin Herman Plaza and other locations in San Francisco to be determined, where the public can watch races on large outdoor television screens.	

Sustainability Features and Operations

The Host Agreement provides that the City, in consultation with the Event Authority, would develop the following Event-related implementation plans to support the race events and activities defined as the "Space Plan" in the Host City Agreement:

People Plan

Consistent with the provisions of the Host Agreement, the City will develop a People Plan, which would set forth provisions for planning and managing support services, including a transportation management plan, to allow race sponsors and spectators to attend the 2012 and 2013 races. The People Plan would include:

- Access to the Event venues for the Event Authority, the Authority Affiliates, Competitors, Event Sponsors, the media and others together with their equipment;
- A set up and operations plan to organize and manage spectator crowds to ensure protection of parklands and natural habitat resources, and to ensure public open spaces are appropriately returned to their original use.
- Effective public transportation service to the public areas including the on-shore Venue and the on-the-water Spectator Areas during the Event;
- A program and managing parking spaces in and around the Venue as provided in the Space Plan for the Authority, the Authority Affiliates, Competitors, the media, the Event Sponsors and hospitality guests;
- A program for managing public parking lots and facilities as provided in the Space Plan which may also include, if public transportation alternatives are deemed inadequate to transport spectators from the parking facilities to the on shore spectator areas, the additional operation of a shuttle service; and
- An appropriate information and sign-posting system in and around the City and, in particular, on main accesses from highways, main entrance roads, airports and public transit stations.

The People Plan would examine alternatives for transportation to Event venues using multiple modes, including temporary transit enhancements along the F-Line Embarcadero corridor, and temporary transit service to locations including Fort Mason and Crissy Field. The People Plan would also examine the need for possible partial street closures to encourage pedestrian and bicycle access. Major Event areas would include secure bicycle parking facilities. The People Plan would also examine water-oriented transportation service, including ferry and excursion access to potential Event viewing locations such as Treasure Island and Angel Island.

Waste Management Plan

Consistent with the provisions of the Host Agreement, the Department of the Environment, in consultation with the Event Authority, the Port, GGNRA, and SAFR would develop a Waste Management Plan to examine options for recycling, composting and waste reduction to exceed the City's goals for landfill diversion. Elements of the Waste Management Plan would include requirements for food and beverage vendors to use compostable and/or recyclable to-go food utensils and packaging; requirements for vendors to maintain adequate composting and recycling receptacles and service levels to meet demand for expected crowds; coordination with local recycling and composting collection forms to ensure adequate collection service; and prohibitions on the use of non-recyclable or non-compostable food service materials in Event areas.

LEED or LEED-Equivalent Plan

Consistent with the provisions of the Host Agreement, the Event Authority, in consultation with the Department of the Environment, would develop a LEED-Equivalent Plan that would describe the means by which: (a) consistent with Chapter 13C of the Port of San Francisco Building Code, the Event Authority will endeavor to meet or exceed LEED or LEED-equivalent ratings for Event-related infrastructure improvements; (b) the Event Authority's activities for the Event will be carbon neutral and zero waste; and (c) the Event Authority will promote resource sustainability and environmental stewardship.

The Event Authority, the Department of the Environment and the Port would also examine means of sustainable provisioning and supporting spectator vessels.

THE JAMES R. HERMAN CRUISE TERMINAL AND NORTHEAST WHARF PLAZA

The San Francisco Port Commission proposes the development of a new passenger cruise terminal at Pier 27[3], and is proposed to be named in honor of James R. Herman, former Port Commissioner and President of the International Longshore and Warehouse Union. The James R. Herman cruise terminal would be designed to meet modern ship and operational requirements of the cruise industry and to provide an appropriate, welcoming gateway to the City for the cruising public.

The Port's current cruise terminal is located at Pier 35, four piers north of Pier 27. Pier 35 is one of the Port's historic finger piers and is in deteriorated structural condition. It has become increasingly constrained for modern cruise operations, as cruise ship size, servicing and security requirements have grown, and tax the physical limitations of Pier 35's shed, its narrow apron width needed for provisioning, ground transportation access and passenger service capability. The Port Commission's efforts to plan for a new facility at Pier 27 anticipates retaining Pier 35 as a secondary terminal when there are multiple cruise calls.

In concert with the cruise terminal facility, the Port proposes to create and construct the Northeast Wharf Plaza, an approximately 2½ acre public open space to be located along the west end of Pier 27, fronting The Embarcadero Promenade. The Northeast Wharf Plaza is a planned public open space in the Port's Waterfront Land Use Plan and the San Francisco Bay Conservation and Development Commission's (BCDC) San Francisco Waterfront Special Area Plan.

[3] In September 2006, Mayor Gavin Newsom appointed a Blue Ribbon Cruise Terminal Advisory Panel to provide recommendations to the San Francisco Port Commission regarding improvements to retain and support San Francisco's cruise ship industry, in light of major business, operational and regulatory changes affecting the industry. The Panel recommended Pier 27 as the location for a new cruise terminal. Following completion of a Pier 27 feasibility analysis, the Port Commission entered into a Memorandum of Understanding with the City's Department of Public Works to secure design services and cruise terminal consultants to analyze and produce conceptual proposals for a Pier 27 cruise terminal, and integrated public open space, the Northeast Wharf Plaza. More information is available on the Port's website at http://www.sfport.com/index.aspx?page=282.

The Port has contracted with San Francisco Department of Public Works (DPW), Bureau of Architecture, which is working with the joint venture design team of KMD/Pfau Long consultant team, including cruise industry experts (Design Team) to prepare integrated concept designs for the cruise terminal and public plaza. On December 14, 2010, the Port Commission selected Design Concept B2 as its preferred proposed design for the cruise terminal, and directed staff to work with DPW and the Design Team to produce schematic design plans for the project, which would undergo design and regulatory review by public and permitting agencies.

Cruise Terminal

Design Concept B2 proposes the demolition of most of the existing Pier 27 cargo shed, to open up site area for construction of a new, approximately 96,000-square-foot structure to house a two-story cruise terminal, and Northeast Wharf Plaza. The footprint of the new cruise terminal structure would occupy approximately 57,000 square feet, and would be positioned along an axis adjacent and parallel to the Pier 27 berth (See Figures 9-11). The proposed size of the terminal facility was defined by the Design Team as optimal to serve current and anticipated ship berthing requirements, and associated passenger flows.

Passengers departing from and arriving in San Francisco would pass through the terminal, which would house ticketing, baggage, and Customs and Border Protection area and security operations. The cruise terminal improvements would include installation of new equipment, including an overhead gangway for boarding passengers on and off ships berthed along the Pier 27 apron. The cruise ship shoreside power infrastructure would be in place to provide electricity to power the cruise ships.

The valley between Pier 27 and 29 is proposed as the Ground Transportation Area (GTA) for the cruise terminal. The GTA would be approximately three acres providing sufficient space to support access, drop-off and exiting by trucks, taxis, buses and passenger vehicles to meet ship provisioning and passenger loading needs of the cruise terminal. The GTA circulation and operation plan includes vehicle queuing space, and is proposed to meet all transportation needs off-street, in an effort to remedy traffic congestion and transportation conflicts currently generated from Pier 35 cruise terminal operations impacting The Embarcadero Roadway and Promenade. As shown in Figure 10 the GTA would be striped to provide separated access and circulation by buses, taxis and vehicles serving passenger drop-off and pick up needs, with management provided by transportation control personnel. The managed operation of the GTA also would include schedules and designated areas to accommodate provisioning trucks that deliver supplies and services for the cruise ships before and after passenger embark/debark periods.

In recent years, the Port has received cruise ship calls that have fluctuated between 40 and 80 calls a year, which is expected to continue for the foreseeable future. If constructed, the relationship of the cruise facilities at Pier 27 and Pier 35 would be reversed from current conditions; Pier 27 would become the Port's primary cruise terminal, and Pier 35 would serve as a secondary facility in the event that two cruise ships require berthing at the same time. While the annual number of ship calls is expected to remain the same in the future, cruise ship size is growing, holding larger numbers of passengers. The level of improvements and equipment proposed in the Pier 27 cruise terminal would be designed to optimally handle vessels carrying

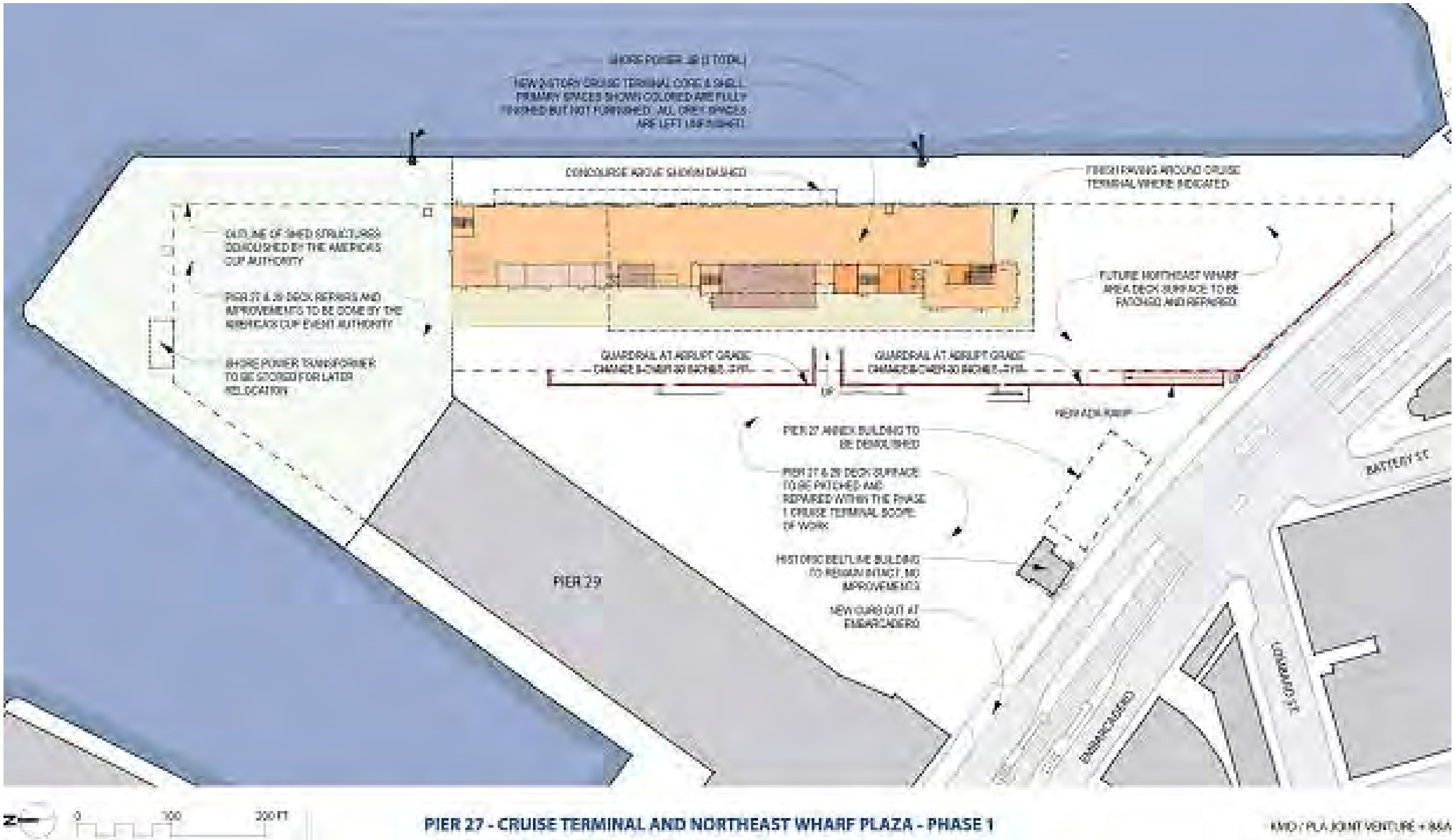

Figure 10 – Proposed Pier 27 Cruise Terminal and Northeast Wharf Plaza - Phase I
Source: KMD/PLA Joint Venture + B&A, February 2011

Figure 11 – Proposed Pier 27 Cruise Terminal and Northeast Wharf Plaza – Phase 2
Source: KMD/PLA Joint Venture + B&A, February 2011

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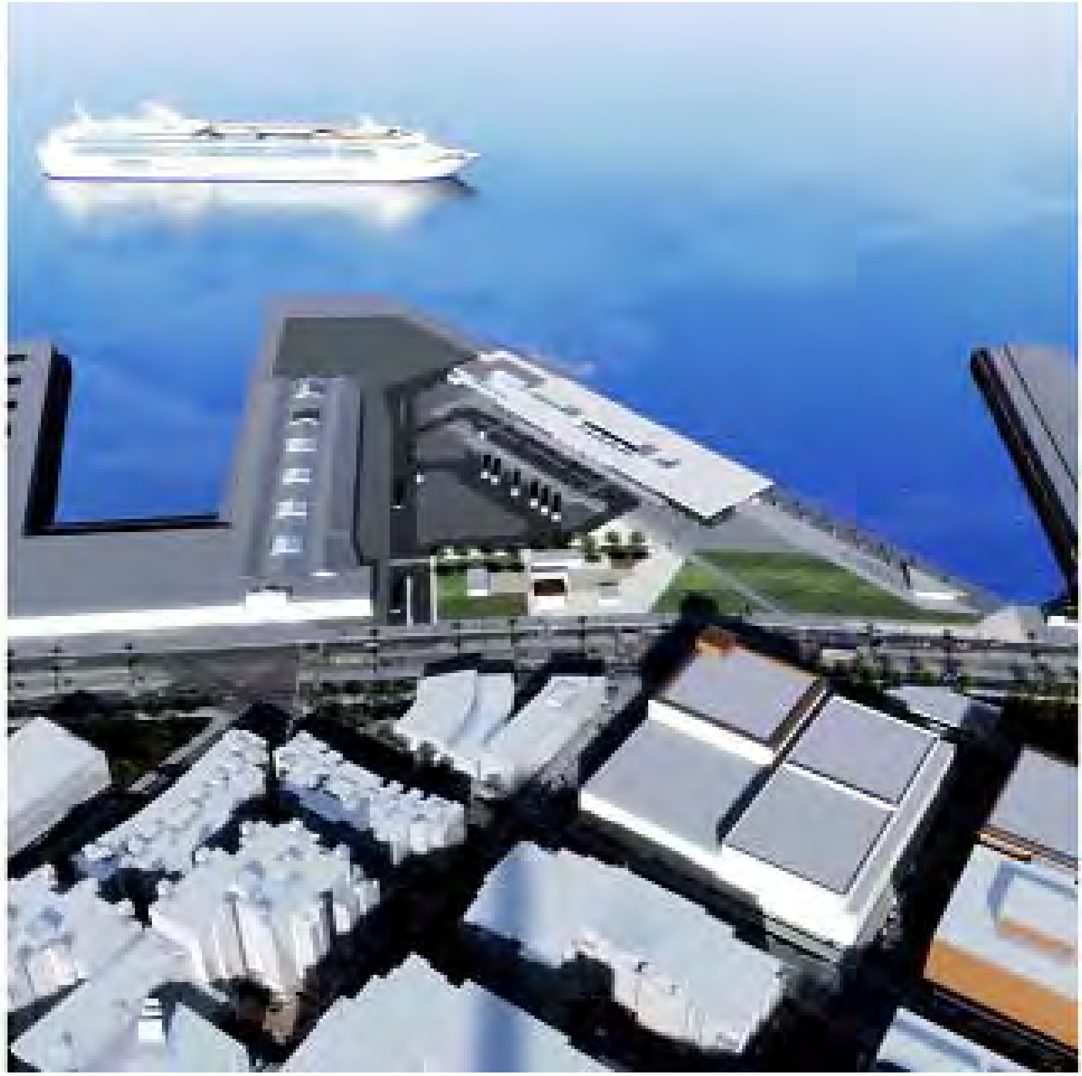

Figure 12 – Proposed Pier 27 Cruise Terminal and Northeast Wharf Plaza Conceptual Rendering – Phase 2
Source: KMD/PLA Joint Venture + B&A, February 2011

2,600 passengers (base design load), and would provide some additional capacity at key areas to serve vessels carrying up to 4,000 passengers (peak design load). Additionally, the facility would continue to be used for maritime events, such as Fleet Week, foreign navel diplomatic calls, Tall Ships Festivals and visits by oceanic research vessels.

The Pier 27 site plan also may be designed to include ancillary commercial revenue-producing uses, such as food and beverage, to serve passengers and visitors to Pier 27. Up to 20,000 square feet of space could be provided for these uses, which are being considered for the west end of the cruise terminal, to provide a visible, active use adjacent to the Northeast Wharf Plaza open space.

The Port would initiate a request to amend the BCDC Special Area Plan (an element of the San Francisco Bay Plan) proposing the following modifications to the Special Area Plan, subject to public review and comment:

- Removal of the northeast portions of the Pier 27 and Pier 29 sheds, complying with Secretary's Standards, instead of the existing requirement to remove the northeast half of the Pier 23 shed;
- Phased park improvements at the Northeast Wharf Plaza and the northeast portion of the Pier 27-29 pier deck, with provisions to allow cruise ship provisioning on cruise days;
- Phased public access improvements to the Pier 27 and Pier 23 aprons, along the Embarcadero, and through the Pier 29 shed to the Pier 29 apron; and
- Augmenting the Pier 23-27 Open Water Basin with phased, potential new Open Water Areas at Pier 54 (fronting Mission Bay Shoreline Park).

Northeast Wharf Plaza

The proposed Northeast Wharf Plaza would provide an approximately 21/2 acre open space at the western end of Pier 27, fronting along The Embarcadero Promenade. Pursuant to the planning policies and objectives in the Port and BCDC's plans, Northeast Wharf Plaza would be designed to serve as a major waterfront park resource to support passive recreational enjoyment and expansive public views of San Francisco Bay.

The cruise terminal Design Team has developed various design concepts for the Plaza, integrated with the cruise terminal facility. They consider various topographical, material and landscaping treatments and characteristics. The open space plans include a "piazza" feature along the western edge of the valley, which would require the demolition of the Pier 27 Annex office building. The historic Pier 29 Beltline Office building would be preserved and integrated into the park/piazza design. Pending review by the BCDC and City waterfront design committees, there is no preferred improvement plan for the Plaza defined at time.

The Northeast Wharf Plaza would provide a gathering area for passengers and non-passengers to view cruise ships when in port, although physical access to the ships would be restricted to passengers and personnel. Federal Homeland Security rules would require temporary fencing or other structure along the Pier 27 apron extending into the Northeast Wharf Plaza to maintain separation between the general public and ships in port; when there are no cruise ships, fences would be opened to restore public access to the extent practicable.

Coordinating America's Cup and Cruise Terminal Construction Phasing

As discussed above, Pier 27-29 is proposed as the America's Cup Village, the hub of hospitality, entertainment and spectator viewing of the sailing races. The improvements required to support this use are being coordinated with those for the cruise terminal. Initially, the Port proposed to demolish about 900 feet of the Pier 27 shed to open up site area for the new cruise terminal structure and the Northeast Wharf Plaza. The AC34 proposal to demolish the entirety of Pier 27 shed and a portion of the Pier 29 shed to create the spectator viewing platform at the eastern end of Pier 27-29 also would require relocation of the cruise ship shoreside power system to accommodate AC34 sailboats and vessel mooring along Pier 27. The proposed cruise terminal would be phased to start with construction of the building shell, which would be used to house proposed team hospitality suites for AC34. After the conclusion of AC34 sailing events, the building would be further improved and equipped to serve cruise terminal functions. The AC34 spectator area would open up approximately 160,000 square feet at the end of Pier 27-29. The smaller footprint of the proposed cruise terminal building (as compared to the existing Pier 27 shed) also would result in larger expanses of open deck area in the valley. In combination, these changes would create substantial new opportunities for public access and viewing from The Embarcadero to the end of Pier 27-29. The Design Team is evaluating an expanded range of public access options for the cruise terminal project in response to these changes that also meet terminal operations, ship provisioning requirements, and Federal Homeland Security requirements when cruise ships are in port.

Shared Uses

While the cruise terminal would be a permanent facility, there are down times between cruise ship calls that allow for shared uses. The design for the new cruise terminal building provides for approximately 60,000 square feet of space for shared uses, to generate revenues when cruise ships are not berthed. The shared use area, which may extend to the GTA, would accommodate events, conferences and public or private gatherings. While the James R. Herman cruise terminal and Northeast Wharf Plaza are the primary project objectives for Pier 27, the event and commercial components are intended to both complement the cruise terminal and thrive independently to maintain an active presence. This also supports recreational enjoyment of the Northeast Wharf Plaza and public open spaces on Pier 27.

APPROVALS REQUIRED

The Project would require a host of local, state, and federal permits and approvals. The City has initiated contacts with several agencies to determine information and analysis requirements which may result in refinements to the Project. The coordination efforts would continue through the pre-development process and would inform the contents of the EIR. A preliminary list of permits and approvals that would be required for the proposed project includes:

- U.S. Coast Guard – Determination of race area requirements
- Federal Aviation Administration – Determination of flight area requirements
- U.S. Army Corps of Engineers – Clean Water Act, Section 404 permit (and NEPA compliance as appropriate) for the discharge of dredged or fill material into waters of the U.S.
- U.S. Fish and Wildlife Service – Consultation under Section 7 of the Federal Endangered Species Act, in conjunction with the Army Corps Section 404 permit.
- National Marine Fisheries Service – Consultation under Section 7 of the Federal Endangered Species Act, in conjunction with the Army Corps Section 404 permit.
- National Historic Preservation Act Section 106 Compliance - State Historic Preservation Officer Consultation, in conjunction with the Army Corps Section 404 permit.
- National Park Service – Permits to use GGNRA and SAFR lands.
- Presidio Trust – Permits to use Crissy Field.
- San Francisco Bay Conservation and Development Commission – Bay Plan Amendment and one or more Major Permits for fill and uses over the Bay or on the shoreline, including maximum feasible public access.
- California State Lands Commission – Consult regarding use plan, permit dredging.
- Regional Water Quality Control Board, San Francisco Bay Region – Section 401 Water Quality Certification; Waste Discharge Requirements; National Pollutant Discharge Elimination System, Construction General Permit coverage and preparation of a Stormwater Pollution Prevention Plan.
- California Department of Fish and Game – California Endangered Species Act Section 2080.1 consistency determination or California Endangered Species Act Section 2081 incidental take permit.
- Bay Area Air Quality Management District – Authority to construct permit and Permit to Operate.
- San Francisco Planning Commission certification of the Final EIR.
- San Francisco Port Commission approval of venue leases; adoption of CEQA findings and a Mitigation Monitoring and Reporting Program.
- San Francisco Board of Supervisors consideration of any appeals of the Planning Commission's certification of the Final EIR.

ENVIRONMENTAL REVIEW TOPICS

The proposed project could result in potentially significant environmental effects. As required by CEQA, the EIR will examine those effects, identify mitigation measures, and analyze whether proposed mitigation measures would reduce the environmental effects to a less than significant level. The EIR will analyze the environmental issues listed below. The EIR will also present an alternatives analysis that may reduce or eliminate one of more potential impacts of the proposed project.

- Land Use
- Aesthetics
- Population and Housing
- Cultural and Paleontological Resources
- Transportation and Circulation
- Noise
- Air Quality
- Greenhouse Gas Emissions
- Wind and Shadow
- Recreation
- Utilities and Service Systems
- Public Services
- Biological Resources
- Geology, Soils, and Mineral Resources
- Hydrology and Water Quality
- Hazards and Hazardous Materials
- Agriculture and Forest

FINDING

This project may have a significant effect on the environment and an Environmental Impact Report is required. This determination is based upon the criteria of the California Environmental Quality Act (CEQA) Guidelines, Sections 15063 (Initial Study), 15064 (Determining Significant Effect), and 15065 (Mandatory Findings of Significance).

PUBLIC SCOPING PROCESS

Pursuant to the State of California Public Resources Code Section 21083.9 and CEQA Guidelines Section 15206, two public scoping meetings will be held at the following locations, dates, and times:

1. **Wednesday, February 23rd, 2011, at 6:30-8:30 pm at San Francisco Board of Supervisors Chamber, Room 250, City Hall, 1 Dr. Carlton B. Goodlett Place**

2. **Thursday February 24th, 2011, at 6:30-8:30 pm at the Port of San Francisco, Pier 1, the Embarcadero**

The purpose of the public scoping meetings is to receive oral comments to assist the San Francisco Planning Department in reviewing the scope and focus of the EIR. The public will have the opportunity to comment and offer testimony for consideration. The San Francisco Planning Department will also accept written comments at this meeting or by mail, email, or fax until **5:00 p.m. on Friday, March 11, 2011**. Written comments should be sent to Bill Wycko, Environmental Review Officer, San Francisco Planning Department, 1650 Mission Street, Suite 400, San Francisco, CA 94103, or sent by email to Joy Navarrete, the CEQA coordinator for this project, at joy.navarrete@sfgov.org.

If you work for a responsible State agency, we need to know the views of your agency regarding the scope and content of the environmental information that is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency may need to use the EIR when considering a permit or other approval for this project. Please include the name of a contact person in your agency.

February 8, 2011
Date

Bill Wycko
Environmental Review Officer

APPENDIX PD

Project Description Supporting Information

PD-1. Analysis of Potential Visitation Patterns for America's Cup 34

PD-2. Open Water Basin Dredging Boundaries for Piers 32-36, Piers 28 South – Pier 30 North, and Piers 14-22½

PD-3. Golden Gate National Recreation Area's Preliminary America's Cup Management Zone Planning Maps

APPENDIX PD-1
Analysis of Potential Visitation Patterns for America's Cup 34

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Analysis of Potential Visitation Patterns for America's Cup 34

INTRODUCTION

This report summarizes the methodology and analysis for estimating visitation patterns for America's Cup 34 (referred to as "AC34"), to be held in San Francisco from in August and September of 2012 and July through September in 2013. The purpose of this report is to develop estimates of the number of visitors on peak days in specific geographic areas to inform current planning efforts.

This report is divided into the following sections:

- Background and Methodology
- Key Assumptions and Considerations
- Estimate of Overall Visitor Attendance
- Visitation Patterns and Peaking
- Estimated Geographic Distribution of Peak Day Attendance
- Estimates for 2012 World Series

This analysis was conducted by Economics at AECOM (formerly Economics Research Associates) staff, in conjunction with the America's Cup Event Authority (ACEA), staff from the City and County of San Francisco, and the City's EIR consultant team.

BACKGROUND AND METHODOLOGY

There are two previous studies that included visitor projections for AC34. These studies were both conducted for the purpose of estimating economic and/or fiscal impacts. Given their purpose, both studies did not utilize a detailed approach to developing an attendance estimate, but rather, developed visitor projections that could be used as a reasonable basis for calculating economic impacts. Both studies were also more focused on evaluating net new visitors (i.e., net of visitors who would have come without the event), since this is the basis of economic impact. The visitor projection in both studies is reasonable given the purpose of their studies. However, a more focused methodology is required for the purpose of estimating AC34 spectators for planning purposes. Both studies also did not drill down beyond total attendance numbers to estimate visitation patterns.

The methodologies used by these studies are described below:

- Beacon Economics assumed that there would be a total of 2.75 million visitor days, of which, 2.3 million would be from local residents. The resident number is 115 percent greater than the local visitor days in Valencia and was developed assuming that the AC34 in 2013 would be roughly the equivalent of two Fleet Weeks. The Beacon report estimated that there would be a total of 450,000 non-local visitor days, equivalent to the number in Valencia. This was noted in the report as a conservative estimate that could be used as a baseline for economic impact purposes that would likely be higher given the larger population and income levels within reasonable proximity to San Francisco.

- The San Francisco Office of the Budget and Legislative Analyst reviewed the Beacon Economics report in a separate study. While this study found the estimates in the Beacon report reasonable, the Budget and Legislative Analyst also determined that a broader range of visitation was advisable for estimating economic impacts and used a range of 2.2 to 7.2 million visitor days by applying percentages to the Beacon Economics estimates.

Thus, while the Beacon Economics study addresses visitation, that was not its primary focus, and the projection was intentionally conservative as it was an input to economic factors of greater interest. The Budget and Legislative Analyst used a very wide range based upon the initial Beacon Economics estimate to demonstrate the breadth of possibilities.

At this point in the planning process, there is a need to develop an attendance projection and estimate visitor flow patterns that can be used for physical planning purposes.

Overview of Penetration Rate Methodology

The "gold standard" for estimating attendance potential at any attraction, event, or entertainment venue is "penetration rate analysis." Projecting attendance using penetration rates has been used for several decades to project attendance at both permanent attractions and more temporary events, including World Expos, Olympics, and festivals, and is a widely accepted industry standard.

Penetration rate methodology basically applies percentages, or penetration rates, to defined market segments (typically local residents and tourists) in order to determine attendance. The penetration rates themselves are based upon the following factors:

- The visitor experience and appeal of the planned program and/or concept for the event or attraction;
- Site and/or venue characteristics that might affect market potential;
- Market characteristics, including size, demographics, and other relevant characteristics;
- The experience of comparable events internationally, including their overall attendance, visitor origin, penetration rates into available resident and tourist markets, and other key metrics; and
- The experience of local events as relevant.

An important step in developing appropriate penetration rates is identifying the differentiating factors between comparable events and the event being analyzed and adjusting the penetration rates appropriately. This process is particularly important in the case of AC34, given the limited number of comparable events with available data and the unique characteristics of each one. Differentiating factors that affected our analysis are described in the "Key Assumptions and Considerations" section that follows later in this report.

Overview of Key Steps in Analysis

As discussed previously, the goal of this visitation analysis is to understand the number of spectators on peak days as well as to estimate their likely location. In order to get to this level of detail, we conducted the following broad steps:

- Using penetration rate analysis developed a range of total attendance for AC34 in 2013, including race days and non-race days.
- Estimated the attendance attributable to race days and non-race days based upon patterns in previous America's Cup events adjusted by relevant factors.
- Based upon the mid-range attendance scenario, estimated a range of peak day attendance. These estimates are in part based upon the experience in Valencia, the only other race for which detailed daily visitation is available, New Zealand, for which some limited data was available related to peaking,

Bay Area residents and tourist market patterns, and key characteristics of AC34 as planned in San Francisco.

- Using the mid-range peak day visitation number as a baseline, developed a series of visitor day profiles (i.e. average weekend day, average weekday, etc.) along with a likely percentage of visitation and number of days in each category.
- Estimated the broad geographic distribution of a peak average day based upon demographic characteristics and origin of likely spectators.
- Developed more specific geographic distribution estimates for specific areas inside and outside of San Francisco, based upon spectator origin, access, capacity of each location and assumptions about appeal of viewing areas, programming, and marketing.

KEY ASSUMPTIONS AND CONSIDERATIONS

Several assumptions and observations are relevant to the quantitative analysis behind the projections of attendance for AC34:

- By design, every America's cup is unique. Each one has a different number of racing days, different structure of competitive events leading up to the America's Cup finals, and different location.
- Attendance statistics from previous America's Cups are generally for the "Village" accommodating the central hub of race associated activities. In previous America's Cups, little or none of the race itself was visible from the Village, or from the shore in general.
- In San Francisco Bay, AC34 will be visible from multiple public viewing areas all around the Bay within a close range. There will be primary viewing areas that will be directly adjacent to the race course and allow for maximum viewing, and secondary viewing areas with more limited views.
- Because of the easy public assess of the whole series of racing events leading up to and including AC34, millions of individual people will be exposed to the events in-person, and many millions of "attendance-days" will be generated over several months of race related activities.
- The level of interest individuals have in the races will range from the intense interest of participating members of the syndicates and sailing enthusiasts from various countries to casual recreationists along the waterfront who time their outings to see part of the racing activities first hand or are attracted by the venue entertainment.
- From the perspective of race promoters and sponsors, the important statistics are those estimating the total number of people and their multiple exposures to the events that can occur over the entire time period.
- From a planning perspective, the important statistics are those which estimate how many people are present at one time, and especially how large a crowd AC34 attracts on the peak days.
- The exact number of syndicates, race days, and race format is still in development, and attendance is based on assumptions in this memo and present when this analysis was conducted.
- San Francisco routinely accommodates large crowds for events, for example:
  - Ballgames and concerts at AT&T Park (40,000 to 50,000),
  - Major parades and street fairs, such as Carnaval, the Chinese New Year Parade, and the Folsom Street Fair (300,000 to 500,000),
  - Fleet Week and the airshow (over 500,000).
- Given the very long length of time that racing and associated activities will be taking place, the peak day attendances will be a small fraction of the total event attendance.

- Obviously, the final heats of racing will attract significant interest. The final day of the Louis Vuitton series and the final day of the America's Cup itself are assumed to be among the peak days.
- The first days of racing in the LV and AC series are also likely to be among the peak days, because they will be the first days of actual racing after a period of hiatus.
- The attendance estimates presented below are based on expectations of interest within the available markets for the sailboat racing as well as entertainment and other festival activities currently planned.
- The attendance assumptions include a Youth Cup that will be held between the LV Cup and the AC Match races.
- The general public viewing attendance will be affected by weather. At the lower end of the interest continuum, some viewers are likely to be "fair weather attendees."
- The visitation projections are primarily intended to represent spectators who have intent to attend the races and/or festivities.
- Note that the growth of social media between now and 2013 may impact AC34 attendance, either positively or negatively, as aspects of the events leading up to it "go viral."
- Further market adoption of interactive, mobile media (e.g., smart phones) has the potential to even out crowds in viewing areas in real time by directing people away from areas that are already approaching capacities.

ESTIMATE OF OVERALL ATTENDANCE POTENTIAL

AECOM carefully reviewed the experience of three fairly recent America's Cup events in Valencia and New Zealand and developed penetration rates based upon our quantitative analysis and understanding of the key differentiating qualitative factors between previous America's Cups and AC34. We also examined attendance at events in San Francisco. Specific assumptions associated with our analysis are as follows:

- These estimates are for AC34 2013 only. At the end of this report, we provide projections for the AC34 2012 events.
- While the specific number of race days is not yet known, with input from ACEA, we have assumed 45 race days and 40 non-racing days, to be held between July and September 2013. It should be noted that the ultimate number of racing days is not likely to be known until the end of AC34 and does not substantially affect the attendance projection, nor does it affect peak days.
- The number of syndicates is not yet known, but is estimated to be between 10 and 15. The specific number does not materially affect our attendance projection.
- China has just announced its entry into AC34, which we expect will attract interest from the Bay Area's large Chinese American and Asian Pacific Islander population, as well as tourists from the Pacific Rim.
- There is likely to be induced visitation (i.e. additional tourism drawn to San Francisco specifically for this event) based upon the experience of other America's Cup events.
- A detailed program is not yet known for performances, activities, etc. in the village and in other spectator areas. However, based upon conversations with ACEA, it is anticipated that a robust array of programming including entertainment, concerts, food vendors, children's and family activities, and other activities will be planned to accompany the racing. The entertainment is expected to occur during and between races. The America's Cup organizers are placing a special emphasis on creating a well-rounded event alongside the racing with the intent of generating interest in the event.
- The racing will be close to and visible from the shore.

- Projections were made assuming there are no major economic, natural, or other disasters or calamities that would substantially affect the ability of markets to attend the events, and the economy continues to recover.

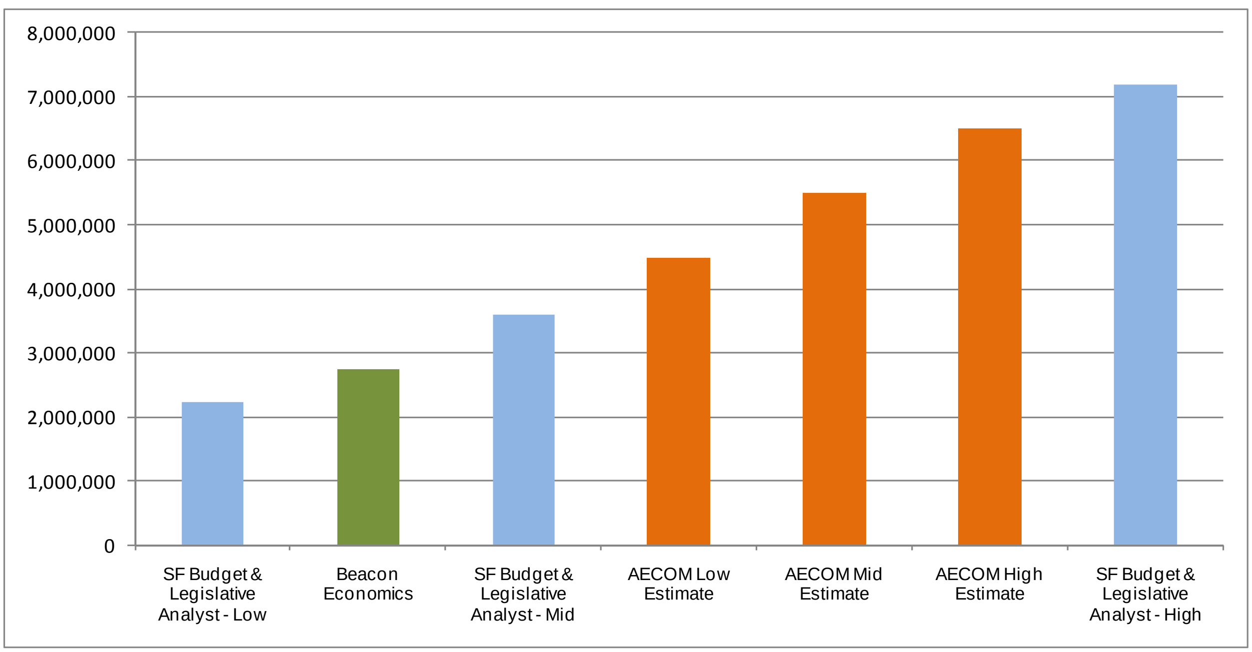
Our resulting attendance projection for AC34 is shown in **Figure 1** below. As indicated, our estimate ranges from 4.5 to 6.5 million, with a mid-range attendance projection of close to 5.5 million. The penetration rates shown were developed by first establishing a baseline from previous America's Cups, and then adjusting for factors discussed in the assumptions below. As shown in **Figure 2** below, our estimates fall with the range of the estimates used by the San Francisco Budget and Legislative Analyst report.

Figure 1: Estimate of Visitation for AC34 2013

Market Segment	Market Size 2013	Penetration Rate Low	Penetration Rate Mid	Penetration Rate High	Projected Visitation Low	Projected Visitation Mid	Projected Visitation High
Resident Market	7,400,000	35%	40%	45%	2,590,000	2,960,000	3,330,000
Tourist Market	12,650,000	15%	20%	25%	1,897,500	2,530,000	3,162,500
Total	**20,050,000**	**22%**	**27%**	**32%**	**4,487,500**	**5,490,000**	**6,492,500**
% Residents						**54%**	
% Tourists						**46%**	

Source: California Department of Finance, San Francisco Travel Association, AECOM.

Figure 2: Comparison to Visitor Estimates in Previous AC34 Studies



Source: San Francisco Budget and Legislative Analyst, Beacon Economics, AECOM.

In **Figure 3** on the next page, key attendance and operating characteristics for the estimated AC34 attendance projection and race are compared to three recent America's Cup events.

Figure 3: Comparison of Attendance Projection and Key Characteristics of AC34 (2013) to Previous America's Cups

Key Factors	New Zealand 2000 AC 30	New Zealand 2003 AC 31	Valencia 2007 AC 32	San Francisco 2013 AC 34
Event Length				
Total No. of Event Days	126	182	94	85
No. of Race Days	55	45	52	45
No. of Non-Race Days	71	137	42	40
% Race Days	44%	25%	55%	53%
% Non Race Days	56%	75%	45%	47%
Visitation				
Total No. of Visitors	4,350,000	3,477,300	2,871,750	5,490,000
% Resident Visitors	59%	51%	53%	54%
% Tourist Visitors	41%	49%	47%	46%
Penetration Rate Analysis				
No. of Resident AC Visitors	2,558,050	1,784,240	1,517,010	2,960,000
No. of Tourist AC Visitors	1,791,920	1,693,060	1,354,740	2,530,000
Size of Resident Market	1,115,000	1,190,000	2,581,000	7,500,000
Size of Tourist Market	7,200,000	7,384,000	2,800,000	12,650,000
# of Hotel Rooms	9,400	10,600	n/a	33,000
Resident Market Penetration Rate	229%	150%	59%	39%
Tourist Market Penetration Rate	25%	23%	48%	20%

Source: AECOM.

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As shown in the above chart, the overall attendance projection is higher for AC34 than previous races, although penetration rates are lower. Below are the factors that we considered in our analysis that contributed to increased attendance:

- In the previous studies, only attendance to the village was included, which likely understated the total visitation.
- China has entered a team into the race.
- There is more local sailing interest in the Bay Area than in Valencia (although not compared to Europe).
- The Bay Area resident market has more favorable income and demographics than the Valencia region.
- There is a more compact schedule, which based upon our discussion with organizers and our review of the data is likely to lead to higher attendance. In AC31, the events were held over a fairly lengthy period, which negatively affected attendance due to increased "race fatigue" and teams leaving early.
- The Bay Area has much larger resident and tourist markets than any of the previous venues.
- The racing can be viewed from the shore of the Bay, compared to both Valencia and New Zealand where much of the viewing was on a large screen in the village as the race was off-shore.
- AC34 will debut brand new 72 foot yachts, which are likely to be played up in the media and attract people.
- There is a specific intent on the part of organizers to provide a robust offering of entertainment and other programming that will attract visitation and transform this event from a race-focused one to a festival with racing. Thus, it may have broader appeal than previous events.

It should be noted that penetration rates are actually lower, primarily due to the large sizes of Bay Area resident and tourist markets. Smaller markets with less competition for people's leisure time typically have higher penetration rates for major events and attractions than do large metropolitan areas such as the Bay Area.

VISITATION PATTERNS AND PEAKING

After developing the overall attendance, AECOM analyzed the likely visitation peaking pattern for the event. We analyzed the available data for Valencia and New Zealand and held numerous discussions with race organizers regarding the qualitative characteristics associated with AC34 2013, as compared to previous events.

The Valencia event experienced peak day visitation of roughly 4.5 percent of total race day attendance, and the New Zealand events were slightly higher. It is our opinion that there is potential for higher peaking for AC34 in San Francisco, given the following factors:

- The racing can for the first time be viewed close to the shore, from several geographic locations in San Francisco. There will be a much greater difference in visitor experience in AC34 than in previous races on race days versus non-race days.
- All weekends are more likely to have racing based upon the schedule and due to the new type of boats. In Valencia and New Zealand, this was not the case, as they were spread over longer periods of time and had races rescheduled to wind conditions. The new 72 foot yachts will provide a wider weather window for racing, likely resulting in fewer weekend race days rescheduled to weekdays.
- The village in San Francisco at Piers 27 and 29 will be in a separate location from team bases, so activity levels may not be as intense as in the village in Valencia and New Zealand on non-racing days, again creating a greater differential between the visitor experiences on race and non-race days.
- The AC Match is designed to have the Oracle team racing, which is not only an American team racing in the United States but also will include Larry Ellison, somewhat of a local celebrity, racing in his own region.

In order to establish visitation patterns, we created several profiles of hypothetical event days with varying levels of interest. We first examined the peak day experience of previous America's Cups, developed an average peak day estimate for AC34 2013, and then developed subsequent assumptions for categories of event days. The estimates are shown in **Figure 4** on the following page.

Figure 4: Estimate of Peak and Average Attendance Days – AC34 2013

Race Day Profile	# of Days	% of Visitation Per Day	% of Visitation Total All Days	Number of Visitors Per Day	Number of Visitors Total All Days
Average Peak Race Day	5	7.0%	35%	334,340	1,671,700
Super Peak Race Day	*1*	*8-10%*	*8-10%*	*400,000-500,000*	*400,000-500,000*
Avg. Peak Race Day not including the Super Peak	*4*	*6.4%*	*26%*	*305,425*	*1,221,700*
Medium High Weekend / Holiday Race Days	6	4.0%	24%	191,050	1,146,300
Average Weekend / Holiday Race Days	12	2.0%	24%	95,530	1,146,000
Average Race Weekdays	22	0.77%	17%	36,910	812,000
Peak Race Weekday	*11*	*1.0%*	*12%*	*50,000*	*550,000*
Non-Peak Race Weekday	*11*	*0.5%*	*5%*	*23,800*	*262,000*
Total Race Days	**45**	**n/a**	**100.0%**	**24,000-450,000**	**4,776,000**
Non Race Day	**40**	**0.33%**	**13.0%**	**18,000**	**714,000**
Total All Days	**85**				**5,490,000**

Source: AECOM.

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A general description of the race day profiles created is as follows:

- An average peak day may consist of the opening race days or race finals for the Louis Vuitton Cup or AC match, competitions featuring high interest countries on weekends, or a day near the beginning or end of the competition with exceptionally good weather. We expect that these days will all occur during weekends.
- A “super peak” day would only likely occur once and would likely result from the intersection of a number of factors, such as a key final with good weather and interesting teams racing, and perhaps a popular entertainment group performing in one of the programmed areas. We have included estimates for an average peak race day with and without the “super peak” day.
- A medium high weekend / holiday race day is likely to be a race day with high interest either due to the teams competing or “shoulder” times close to the opening day or finals. It could also be a race day on a weekend with exceptionally good weather or near a holiday weekend.
- An average weekend / holiday race day would be a typical weekend day with racing, most likely in the middle of the series, during the youth cup, etc.
- An average race weekday is a typical race day during the week. We expect that there may be some peaking during the week as well depending on the teams who are racing, so have included an average peak race weekday as well as a non-peak race weekday.
- Finally, there will be a series of non-race days that will still attract some visitors.

As shown, we estimate that an average peak day (of which there are likely four or five) will attract approximately 334,000 spectators throughout the course of the day. It is possible that one day within this average (i.e. the “super peak day”) could receive higher visitation if the combination of good weather, race schedule and position, and competing teams that generate interest all fall upon one day. An average peak day without the “super peak” day is estimated to attract around 305,000 spectators. For planning purposes, we have used the attendance estimate for an average peak race weekend day, which is 334,000. We have also conducted more detailed analysis for an average race week day, with an estimated attendance of 50,000 spectators.

In order to provide some context for these numbers, we have included the following table which summarizes estimates of attendance data for key festivals and events in San Francisco (see **Figure 5**).

We have also included the visitation pattern from AC32 in Valencia to demonstrate the peaking that typically occurs as part of America’s Cup events (see **Figure 6**).

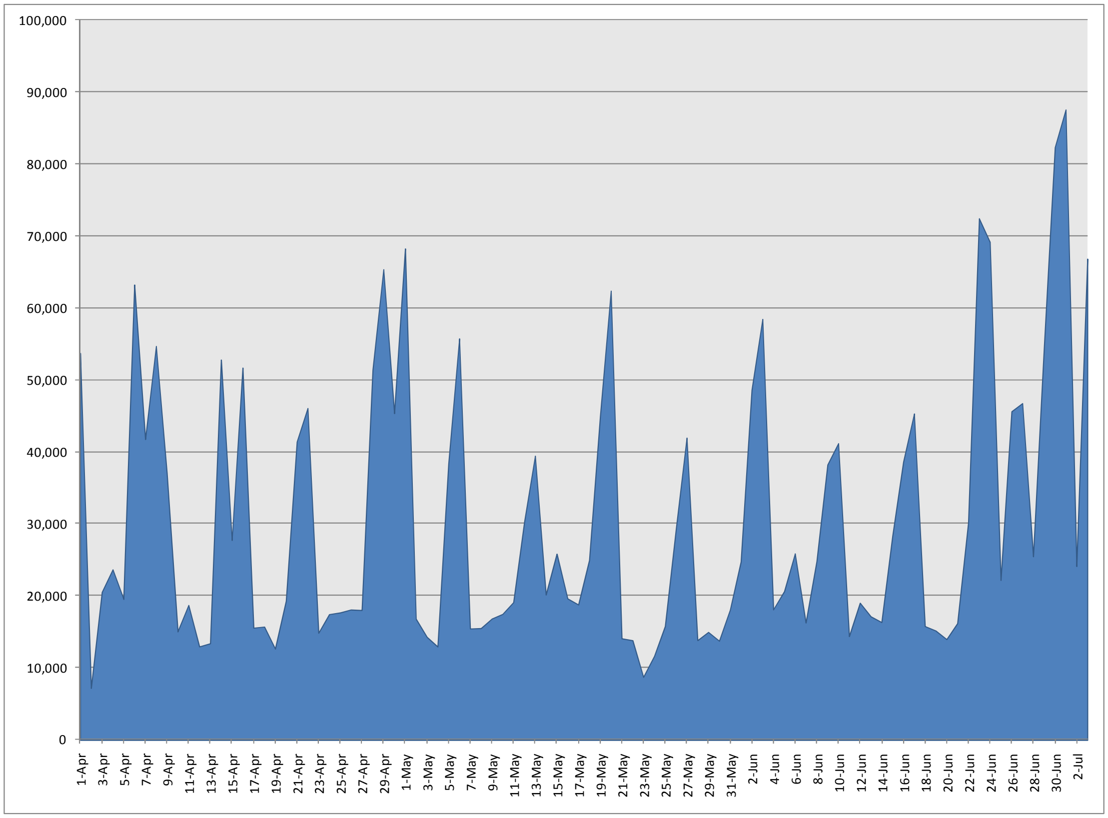
Figure 5: Comparison of Average Peak Day to Other San Francisco Events

Event Name	Attendance	# of Days	Average Attendance Per Day
SF Fleet Week[1]	1,200,000	6	n/a
SF LGBT Pride Parade & Celebration	750,000	2	375,000
Chinese New Year Parade	400,000	1	400,000
Carnaval	400,000	2	200,000
Folsom Street Fair	350,000	2	175,000
Cherry Blossom Festival & Grand Parade	200,000	4	50,000
T Mobile Bike Race	115,000	1	115,000
SF Chinatown Autumn Moon Festival	100,000	2	50,000
Asian Heritage Street Celebration	90,000	1	90,000
St. Patrick's Day Parade	85,000	1	85,000
Sunday Streets (highest visitation)	80,000	1	80,000
Castro Street Fair	62,000	1	62,000
The Dyke March	50,000	1	50,000
SF Giants Game	45,000	1	45,000
SF International Dragon Boat Festival	45,000	2	22,500
SF Juneteenth	35,500	1	35,500
Nihonmachi Street Fair	25,000	2	12,500
Vietnamese Lunar New Year Tet Fetival	25,000	1	25,000
Korean Day Festival & Parade	20,000	1	20,000
SF Aloha Festival	16,000	1	16,000
Comedy Day	6,500	1	6,500
Cinco de Mayo	6,000	1	6,000
Greek Flag Day Cultural Day Celebration & Parade	4,000	1	4,000
Russian Festival	3,000	1	3,000
Parol Lantern Festival & Parade	1,500	1	1,500
Samoan Flag Day Celebration	600	1	600

[1] Fleet Week lasts for 6 or 7 days, although the majority of attendance, assumed to be around 80%, occurs over two weekend days when the Blue Angels perform in the airshow.

Source: San Francisco Grants for the Arts and California Cultural Database Project.

Figure 6: Peaking Pattern from AC32 in Valencia



GEOGRAPHIC DISTRIBUTION OF VISITORS

The next step in AECOM's analysis was to estimate the locations from which spectators on an average peak weekend and weekday race day would likely view the race. We used the following methodology to calculate these estimates:

- We divided the estimated 334,000 spectators on an average peak weekend race day into two major categories: landside spectators and water spectators.
- The number of water spectators was developed based upon input from the race organizers related to the likely number of boats in three categories: large private yachts, commercial charters, and recreational boats (**see Figure 7**).

Figure 7: Estimated Water-based Spectators for AC34 2013

Type of Boat	# of Boats	Avg. No. of Passengers per Boat	Total No. of Passengers
Recreational	2,200	6	13,200
Commerical Charters	20	150	3,000
Large Private Yachts	60	30	1,800
Total All Boats	**2,280**	**8**	**18,000**

Source: AECOM.

- The remaining estimated land spectators were then further divided into two categories, Bay Area residents and tourists, based upon our original penetration rate analysis (assuming a similar distribution to the total attendance).
- We estimated the county of origin for the Bay Area resident spectators by first calculating the percentage of total Bay Area population represented by each county in 2013. We then adjusted this percentage higher or lower based upon several factors including proximity to San Francisco and the major viewing sites for AC34 and demographic characteristics. We applied these new percentages to the total number of estimated Bay Area spectators to develop spectators by county and cross-checked the reasonableness of these numbers by calculating the penetration rates resulting from this analysis.
- Finally, we estimated the percentage of people from each county who would likely travel to San Francisco to view the races and take part in the race festivities versus the number who would travel to locations outside of San Francisco to view the races. It should be noted that for purposes of this analysis, Treasure Island was categorized as outside San Francisco proper. This estimate was based on several factors including availability of public transportation to race viewing areas and the general appeal of viewing areas outside San Francisco available to residents in various counties. It should be noted that AECOM had detailed discussions with race organizers related to the quality of viewing areas in Marin, Treasure Island, Angel Island, and other locations.

The results of this analysis are shown in **Figure 8** on the following page.

Estimate of Visitor Distribution by Specific Viewing Location

Finally, in order to assist with planning efforts and impact studies, AECOM developed a detailed estimate of visitors by specific viewing area (see **Figure 9**). There are several important considerations associated with this projection:

- This estimate represents one hypothetical scenario of where spectators might choose to go to view AC34 races and participate in race festivities on a peak day.
- As part of the analytical process for developing these estimates, we examined the primary spectator areas with the best viewing areas, considered the known destinations such as Crissy Field and Marina Green which typically host Bay-oriented activities and other major festivals, and also evaluated a number of qualitative factors such as transit access, the race course layout, entertainment programming, and assumptions about marketing efforts to encourage visitors to go to programmed areas.
- To a certain extent, the location of spectators can be controlled through race management, marketing, and operations. For example, race organizers can create programming and marketing efforts that will encourage visitors to gravitate towards programmed areas with facilities, services, and activities. They can also limit access in specific areas or program smaller sponsor events.
- We have developed estimates over the course of a day as well as at a peak time, projected to be 80 percent of a peak day attendance. This represents an average, since different race day profiles would likely result in varying hourly peaking patterns.
- While these numbers present an estimate of where spectators might be at any given time, in reality, spectator numbers are fluid, as specatators will walk around, enter restaurants and retail shops, and go in and out of programmed areas even during peak times during a peak day, given the nature of large-scale events with multiple “attractions.”

Figure 8: Estimated Visitor Origin and Location of AC34 2013 Spectators on an Average Peak Weekend Race Day

County	2013 Population	% of Bay Area Population	% of Peak Day Attendance	Avg. Peak Day Spectators	Implied Capture Rate	% watching from non SF locations	# watching from non SF locations	# watching from SF Locations
Alameda	1,554,690	21%	20%	33,900	2.2%	17%	5,800	28,100
Contra Costa	1,102,347	15%	9%	15,200	1.4%	11%	1,700	13,500
Marin	254,752	3%	8%	13,500	5.3%	30%	4,100	9,400
Napa	144,684	2%	2%	3,400	2.3%	7%	200	3,200
San Francisco	816,809	11%	25%	42,300	5.2%	5%	2,100	40,200
San Mateo	731,091	10%	12%	20,300	2.8%	4%	800	19,500
Santa Clara	1,842,527	25%	18%	30,500	1.7%	4%	1,200	29,300
Solano	438,483	6%	2%	3,400	0.8%	7%	200	3,200
Sonoma	501,775	7%	4%	6,800	1.4%	10%	700	6,100
Subtotal Resident Spectators	**7,387,158**	**100%**	**100%**	**169,300**	**2%**	**10%**	**16,800**	**152,500**
Subtotal Tourist Spectators	**n/a**	**n/a**	**n/a**	**147,100**	**n/a**	**5%**	**7,400**	**139,700**
Total Landside Spectators				**316,400**	**n/a**	**8%**	**24,200**	**292,200**
Spectators on Boats				18,000				
Total All Spectators				**334,400**				

Source: California Department of Finance, AECOM.

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- Many specific details for the event and related programming and operations could affect these numbers and are still early in the planning stage. Thus, these estimates are based upon what we know about the event as of April 2011.
- The estimates shown are expected to be in addition to whatever utilization of these areas would otherwise be taking place. The estimates indicate purposeful visitors, or visitors with the intent of watching AC34 events as at least part of their motivation for being along the Bay waterfront that day.

The distribution of visitors is roughly based on assumptions such as:

- The programmed areas will be the most appealing, as they combine prime viewing areas with entertainment, concerts, food vendors, sponsor activities, family activities, large viewing screens, portable toilets, race commentary, and other services. The programmed areas have measurable capacities, and for the most part will likely be close to capacity on peak days given these factors.
- The live sites will be designed as exciting areas with large viewing screens, food, activities, entertainment, and other features which will help draw spectators to them.
- The Embarcadero will be partially closed to allow for spectators and activities on peak days. This area also has a fairly high capacity and is close to the urban core and transit.
- Other areas were divided generally based upon viewing appeal, ease of access, and capacity.
- As stated previously, we have developed estimates for a peak day, as well as for a peak time during the day, estimated at 60 to 80 percent of daily visitation.

The resulting estimates for an average peak weekend race day in 2013 are shown in **Figure 9** on the following page. AECOM then adjusted the peak weekend race day estimates for an average peak race weekday, shown in **Figure 10**.

ESTIMATES FOR AC34 WORLD SERIES IN 2012

Finally, AECOM developed estimates for overall attendance and geographic distribution of visitors on an average peak race weekend day for the World Series in 2012. Current plans for the World Series envision two regattas, one in August and one in September. Each regatta would be between 10 and 14 days, with six race days, some other activity days (i.e. test and media days), and some rest days.

In order to estimate the percentage of overall visitors and visitors on a peak day for the World Series, we examined data from AC32 in Valencia. The year prior to the major race events (i.e. LV Cup and AC Match races), there were a series of races held, some of which were in Valencia. We examined the overall attendance (relative to number of race days) and also evaluated the peaking patterns relative to events the following year in Valencia. Our estimates for the 2012 World Series regattas held in the Bay Area were largely based upon the attendance patterns established in Valencia for events held the year leading up to the major AC32 events.

As shown in **Figures 11** and **12**, based upon input from AC34 event organizers, we segmented the event days into categories based upon likely level of spectator interest. We then estimated attendance for each of those based upon our analysis of the AC32 experience in Valencia, and then calculated total attendance.

An estimate of the geographic location of spectators on a peak race weekend day and a peak race weekday for the two regattas to be held as part of the World Series for AC34 in 2012 is shown in **Figure 13** and **Figure 14**. The major difference between 2012 and 2013 is the availability of Piers 27 and 29 for spectators in 2013.

Figure 9: Estimated Spectators Locations for AC34 2013 – Average Peak Race Day (Weekend)

Location	# of Spectators Per Day	Estimated # of Spectators: Peak Hour
SPECTATORS ON BOATS		
Recreational	13,200	8,000-10,600
Commerical Charter	3,000	1,500-2,400
Large Private Yachts	1,800	1,100-1,400
Subtotal Spectators on Boats	**18,000**	**11,000-14,400**
LANDSIDE SPECTATORS		
Outside San Francisco		
Treasure Island	12,000	7,000 to 9,600
Alcatraz Island (private)	500	300-400
Angel Island	1,000	600-800
Fort Baker / Marin Headlands / North side of GGB	3,500	2,100-2,800
Cavallo Point (private and public)	800	500-650
Sausalito	5,000	3,000-4,000
Tiburon / Belvedere	1,200	700-950
Subtotal Outside San Francisco	***24,000***	***14,000-19,000***
Programmed Areas in San Francisco		
Justin Herman Plaza (Live Site)	8,000	5,000-6,400
Union Square (Live Site)	6,000	3,600-4,800
Civic Center (Live Site)	6,000	3,600-4,800
Marina Green	55,000	33,000-44,000
Piers 27 & 29	50,000	30,000-40,000
Crissy Field (Crissy Center to Pearce / Mason)	77,000	46,000-62,000
Subtotal SF Programmed Areas	***202,000***	***121,000-162,000***
Non-Programmed Areas in San Francisco		
Presidio (incl. Crissy Picnic & west to south side of GGB)	5,000	3,000-4,000
Fort Mason to Aquatic Park	7,000	4,000-5,600
Fisherman's Wharf	25,000	15,000-20,000
NE Embarcadero (Pier 42 to Fisherman's Wharf)	48,000	29,000-38,000
Other	5,000	3,000-4,000
Subtotal SF Non-Programmed Areas	***90,000***	***54,000-72,000***
Subtotal Landside Spectators	**316,000**	**189,000-253,000**
TOTAL SPECTATORS	**334,000**	**200,000-267,000**

Figure 10: Estimated Spectators Locations for AC34 2013– Average Peak Race Day (Weekday)

Location	# of Spectators Per Day	Estimated # of Spectators: Peak Hour
SPECTATORS ON BOATS		
Recreational	4,400	2,600-3,500
Commerical Charter	1,000	600-800
Large Private Yachts	900	500-700
Subtotal Spectators on Boats	**6,300**	**3,700-5,000**
LANDSIDE SPECTATORS		
Outside San Francisco		
Treasure Island	1,500	900-1,200
Alcatraz Island (private)	0	0
Angel Island	50	30-40
Fort Baker / Marin Headlands/ North side of GGB	300	180-240
Cavallo Point (private and public)	150	90-120
Sausalito	225	135-180
Tiburon / Belvedere	25	15-20
Subtotal Outside San Francisco	***2,250***	***1,300-1,800***
Programmed Areas in San Francisco		
Justin Herman Plaza (Live Site)	0	0
Union Square (Live Site)	0	0
Civic Center (Live Site)	0	0
Marina Green	8,200	5,000-6,600
Piers 27 & 29	10,350	6,000-8,300
Crissy Field (Crissy Center to Pearce / Mason)	12,300	7,400-9,800
Subtotal SF Programmed Areas	***30,850***	***18,000-25,000***
Non-Programmed Areas in San Francisco		
Presidio (incl. Crissy Picnic & west to south side of G	500	300-400
Fort Mason to Aquatic Park	1,000	600-800
Fisherman's Wharf	3,900	2,300-3,100
NE Embarcadero (Pier 42 to Fisherman's Wharf)	5,200	3,100-4,200
Other	0	9
Subtotal SF Non-Programmed Areas	***10,600***	***6,300-8,500***
Subtotal Landside Spectators	**43,700**	**26,00-35,000**
TOTAL SPECTATORS	**50,000**	**30,000-40,000**

Figure 11: 2012 World Series Regatta Days by Level of Spectators Interest (per Regatta)

		Interest Level			
Day	**Activity**	**Very High**	**High**	**Medium**	**Low**
Friday	Test Day			1	
Saturday	PR Day				1
Sunday	Fleet Race	1			
Monday	Rest				1
Tuesday	Rest				1
Wednesday	Match			1	
Thursday	Match			1	
Friday	Match		1		
Saturday	Match		1		
Sunday	Fleet Race	1			
Total		**2**	**2**	**3**	**3**

Figure 12: Estimated Attendance by Category for AC34 World Series in 2012 (includes two regattas)

Category	# of Days per Regatta	Total Days in 2012	Avg. People Per Day	Total # of People
Very High Interest Days (Peak)	2	4	197,000	788,000
High Interest - Weekend	1	2	120,000	240,000
High Interest - Weekday	1	2	45,000	90,000
Medium Interest Days	3	6	35,000	210,000
Low Interest Days	3	6	21,000	126,000
Total	**10**	**20**	**n/a**	**1,454,000**

Figure 13: Estimated Geographic Distribution of AC34 World Series Spectators on a Peak Race Day, 2012

Location	# of Spectators Per Day	Estimated # of Spectators: Peak Hour
SPECTATORS ON BOATS		
Recreational	11,000	6,500-8,800
Commerical Charter	2,000	1,200-1,600
Large Private Yachts	0	0
Subtotal Spectators on Boats	**13,000**	**7,500-10,400**
LANDSIDE SPECTATORS		
Outside San Francisco		
Treasure Island	5,500	3,300-4,400
Alcatraz Island (private)	500	300-400
Angel Island	1,000	600-800
Fort Baker / Marin Headlands/ North side of GGB	2,000	1,200-1,600
Cavallo Point (private and public)	800	450-650
Sausalito	3,500	2,100-2,800
Tiburon / Belvedere	1,000	600-800
Subtotal Outside San Francisco	***14,300***	***8,500-11,400***
Programmed Areas in San Francisco		
Justin Herman Plaza (Live Site)	5,000	3,000-4,000
Union Square (Live Site)	0	0
Civic Center (Live Site)	0	0
Marina Green	57,000	34,000-45,000
Piers 27 & 29	0	0
Crissy Field (Crissy Center to Pearce / Mason)	75,000	45,000-60,000
Subtotal SF Programmed Areas	***137,000***	***82,000-109,000***
Non-Programmed Areas in San Francisco		
Presidio (incl. Crissy Picnic & west to south side of G	2,000	1,200-1,600
Fort Mason to Aquatic Park	3,000	1,800-2,400
Fisherman's Wharf	15,000	9,000-12,000
NE Embarcadero (Pier 42 to Fisherman's Wharf)	10,000	6,000-8,000
Other	3,000	1,800-2,400
Subtotal SF Non-Programmed Areas	***33,000***	***20,000-26,000***
Subtotal Landside Spectators	**184,300**	**100,000-147,000**
TOTAL SPECTATORS	**197,300**	**118,000-158,000**

Figure 14: Estimated Geographic Distribution of AC34 2012 World Series Spectators on a Peak Race Weekday

Location	# of Spectators Per Day	Estimated # of Spectators: Peak Hour
SPECTATORS ON BOATS		
Recreational	3,800	2,200-3,000
Commerical Charter	800	450-650
Large Private Yachts	0	0
Subtotal Spectators on Boats	**4,600**	**2,700-3,700**
LANDSIDE SPECTATORS		
Outside San Francisco		
Treasure Island	1,300	750-1,000
Alcatraz Island (private)	0	0
Angel Island	50	30-40
Fort Baker / Marin Headlands/ North side of GGB	250	150-200
Cavallo Point (private and public)	100	60-80
Sausalito	200	120-160
Tiburon / Belvedere	50	30-40
Subtotal Outside San Francisco	***1,950***	***1,100-1,600***
Programmed Areas in San Francisco		
Justin Herman Plaza (Live Site)	0	0
Union Square (Live Site)	0	0
Civic Center (Live Site)	0	0
Marina Green	18,000	10,000-14,000
Piers 27 & 29	0	0
Crissy Field (Crissy Center to Pearce / Mason)	11,000	6,500-8,500
Subtotal SF Programmed Areas	***29,000***	***17,000-23,000***
Non-Programmed Areas in San Francisco		
Presidio (incl. Crissy Picnic & west to south side of G	450	250-350
Fort Mason to Aquatic Park	900	550-700
Fisherman's Wharf	3,500	2,100-2,800
NE Embarcadero (Pier 42 to Fisherman's Wharf)	4,600	2,700-3,700
Other	0	0
Subtotal SF Non-Programmed Areas	***9,450***	***5,600-7,500***
Subtotal Landside Spectators	**40,400**	**24,000-32,000**
TOTAL SPECTATORS	**45,000**	**27,000-36,000**

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APPENDIX PD-2
Open Water Basin Dredging Boundaries for Piers 32-36, Piers 28 South – Pier 30 North, and Piers 14-22 ½

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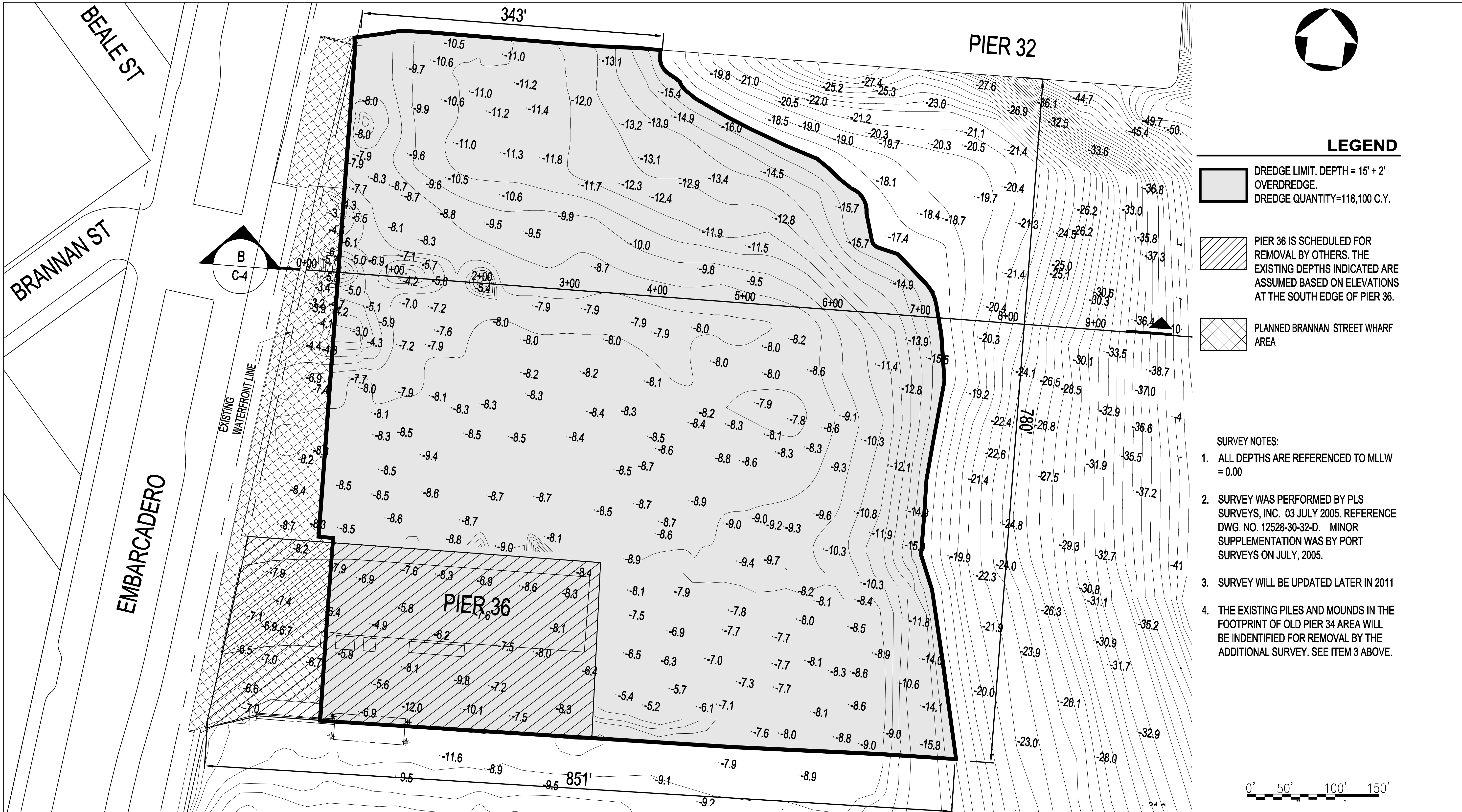
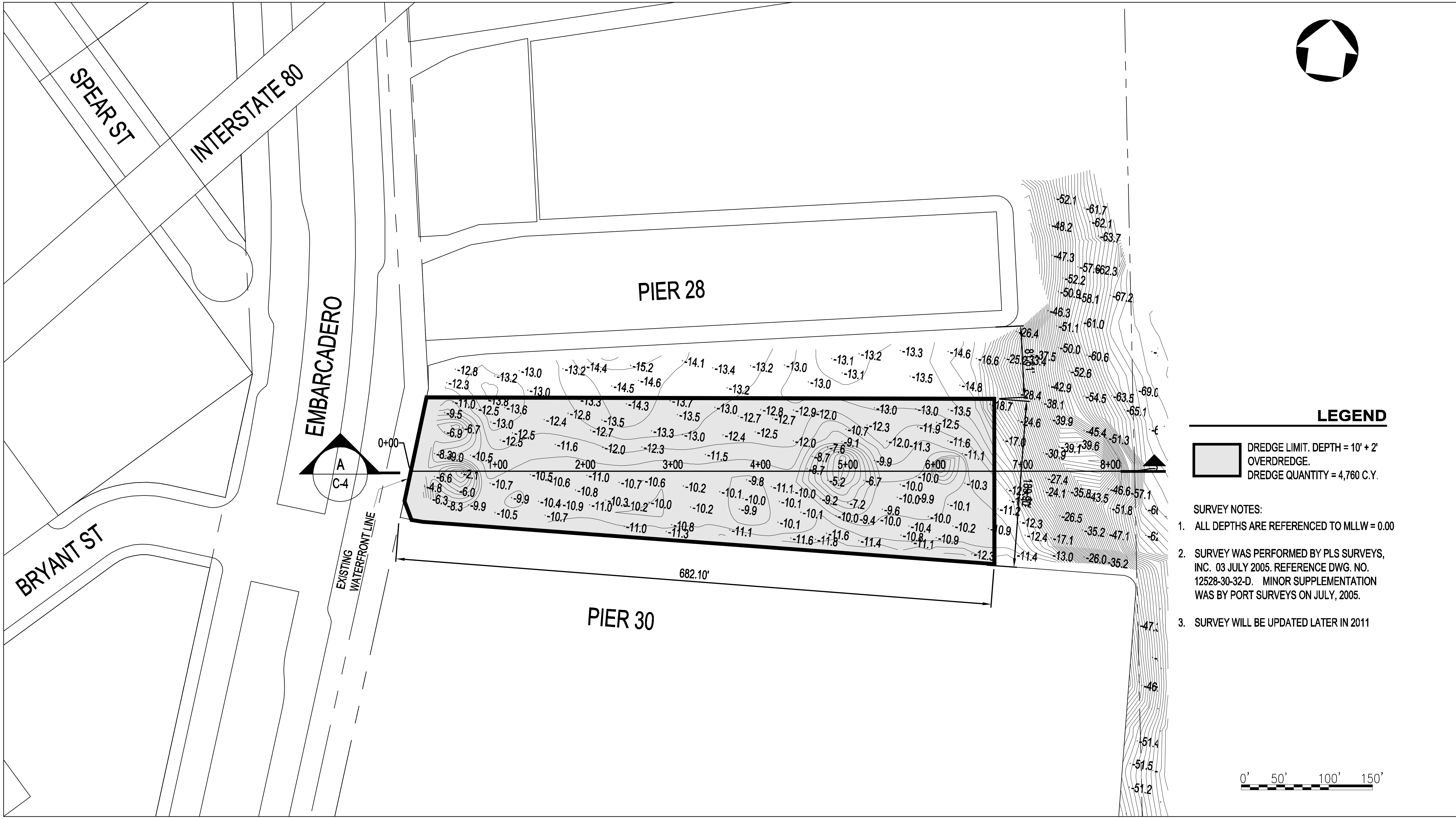


SOURCE: AECOM

Case No. 2010.0493E: AC34 / Cruise Terminal and Northeast Wharf Plaza (210317)

Figure PD-2.1
Piers 32-36 Open Water Basin Dredging Boundary-
AC34 2012/2013

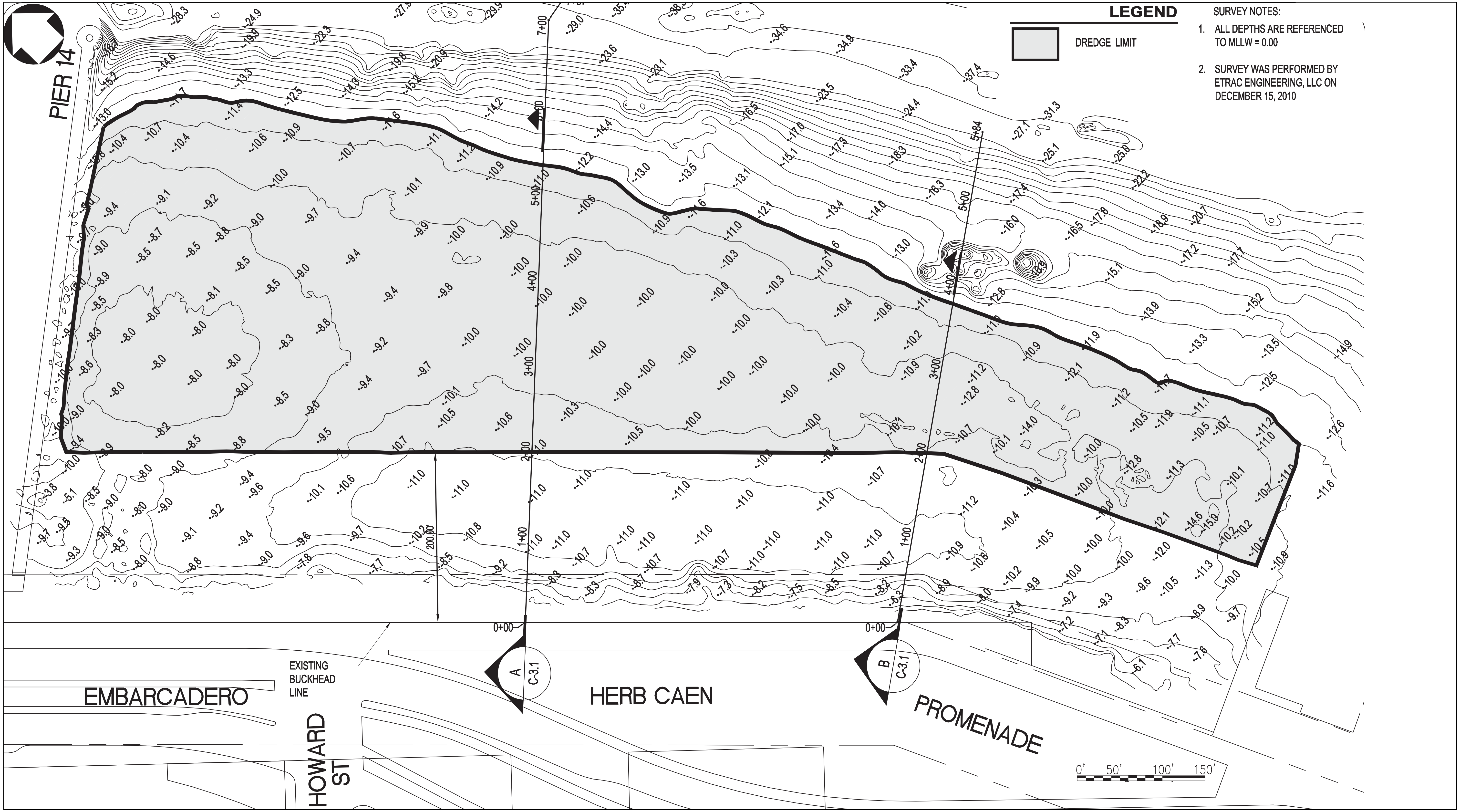


SOURCE: AECOM

Case No. 2010.0493E: AC34 / Cruise Terminal and Northeast Wharf Plaza (210317)

Figure PD-2.2

Piers 28 South - Pier 30 North Open Water Basin Dredging Boundary-
AC34 2013



SOURCE: AECOM

Case No. 2010.0493E: AC34 / Cruise Terminal and Northeast Wharf Plaza (210317)

Figure PD-2.3
Piers 14-22 1/2 Dredging Boundary-
AC34 2013

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APPENDIX PD-3
Golden Gate National Recreation Area's Preliminary America's Cup Management Zone Planning Maps

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Race Area

PRELIMINARY America's Cup Management Zone Planning

Golden Gate National Recreation Area

National Park Service
U.S. Department of the Interior

Fort Baker

PRELIMINARY America's Cup Management Zone Planning

Golden Gate National Recreation Area

National Park Service
U.S. Department of the Interior

Hawk Hill - Kirby Cove

PRELIMINARY America's Cup Management Zone Planning

Golden Gate National Recreation Area

National Park Service
U.S. Department of the Interior

West Crissy Field

PRELIMINARY America's Cup Management Zone Planning

Golden Gate National Recreation Area

National Park Service
U.S. Department of the Interior

East Crissy Field

PRELIMINARY America's Cup Management Zone Planning

Golden Gate National Recreation Area

National Park Service
U.S. Department of the Interior

Fort Mason - San Francisco Maritime

PRELIMINARY America's Cup Management Zone Planning

Golden Gate National Recreation Area

National Park Service
U.S. Department of the Interior

Alcatraz Island

PRELIMINARY America's Cup Management Zone Planning

Golden Gate National Recreation Area

National Park Service
U.S. Department of the Interior

Baker Beach

PRELIMINARY America's Cup Management Zone Planning

Golden Gate
National Recreation Area

National Park Service
U.S. Department of the Interior

APPENDIX LU

Land Use Supporting Information

LU-1. San Francisco Bay Conservation and Development Commission's San Francisco Waterfront Special Area Plan Maps

LU-2. San Francisco Bay Conservation and Development Commission's San Francisco Bay Plan Maps

LU-3. City and County of San Francisco General Plan Land Use Designation Map

APPENDIX LU-1
San Francisco Bay Conservation and Development Commission's San Francisco Waterfront Special Area Plan Maps

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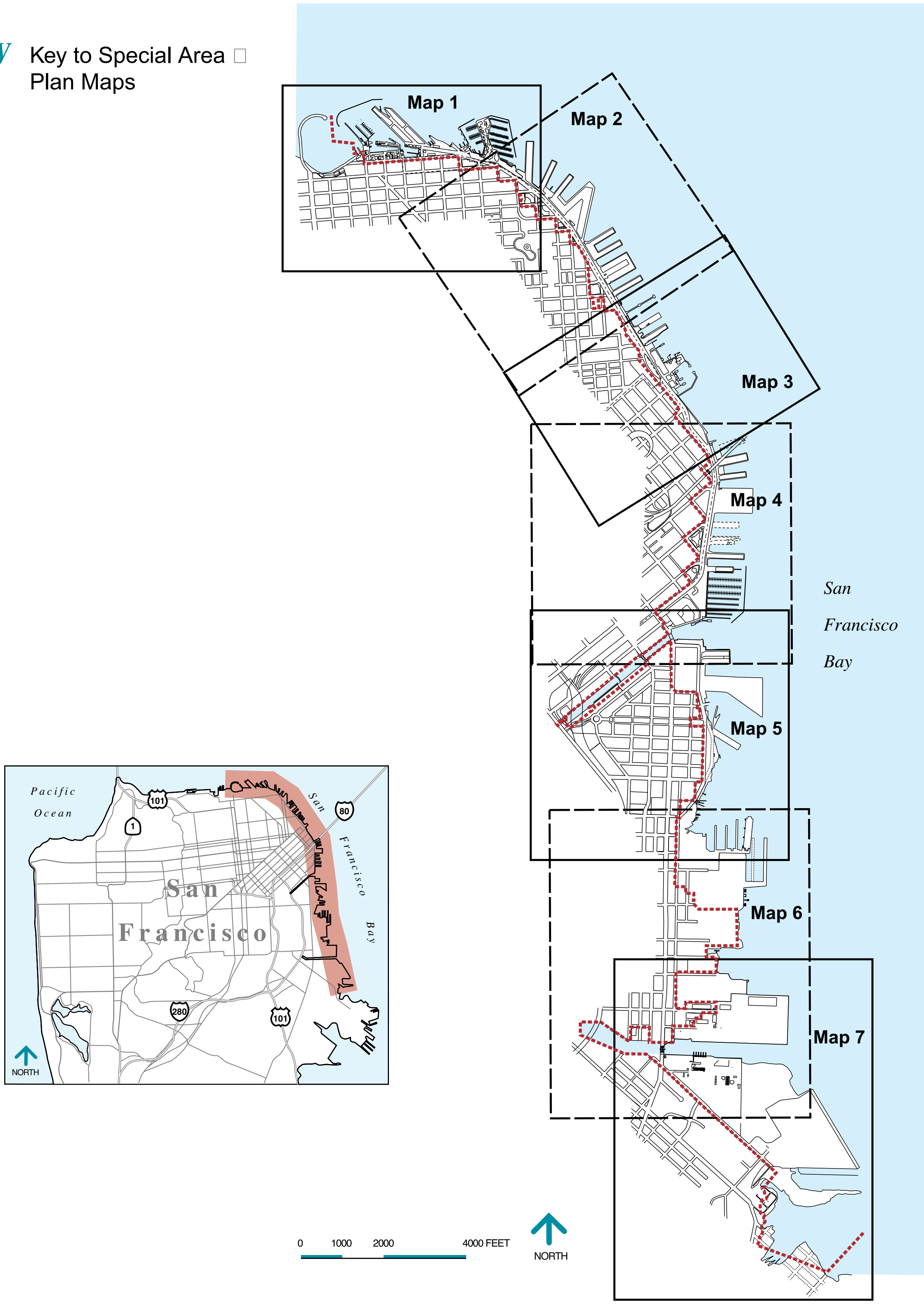
SFW SAP Key to Special Area Plan Maps

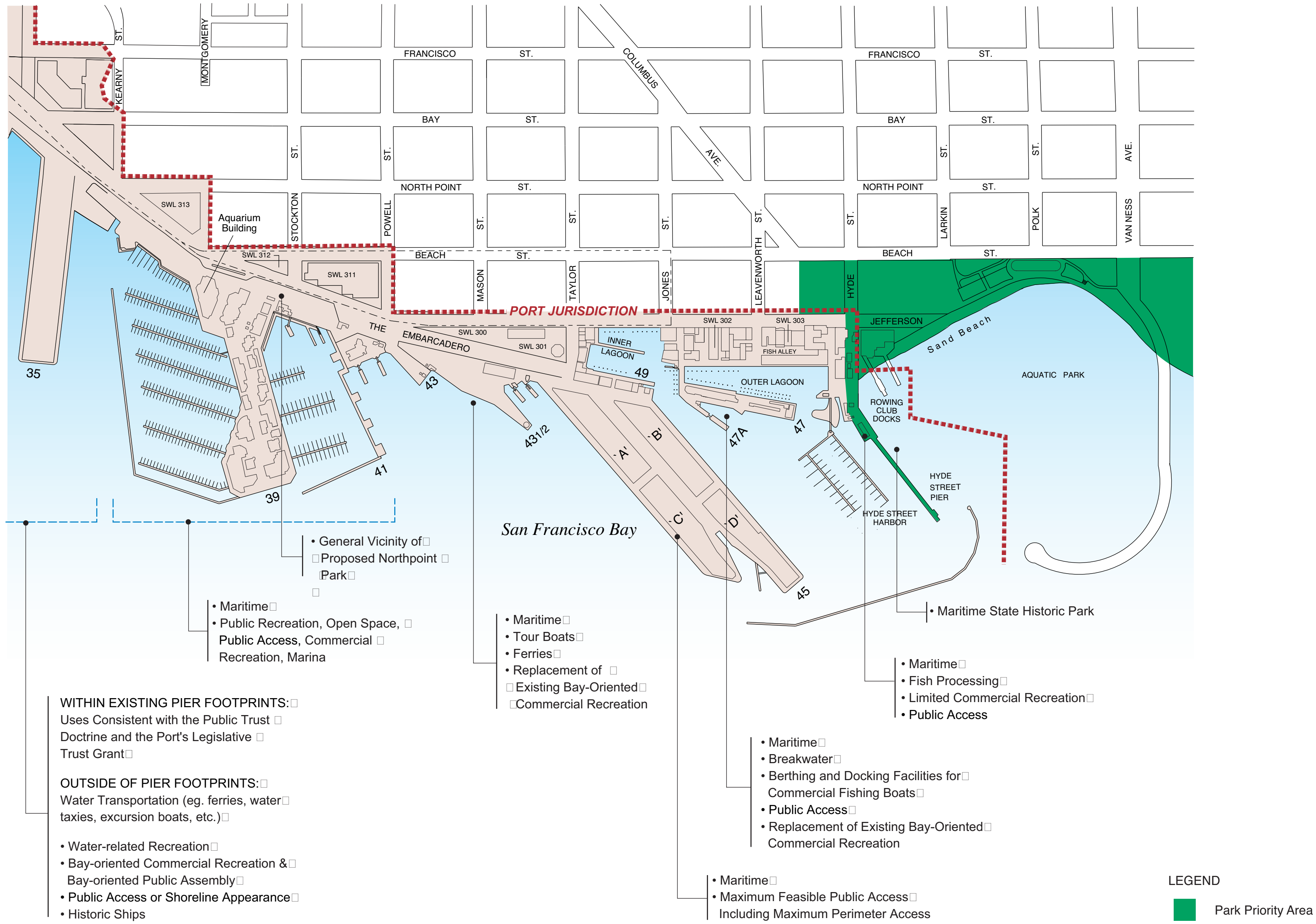


SFW SAP

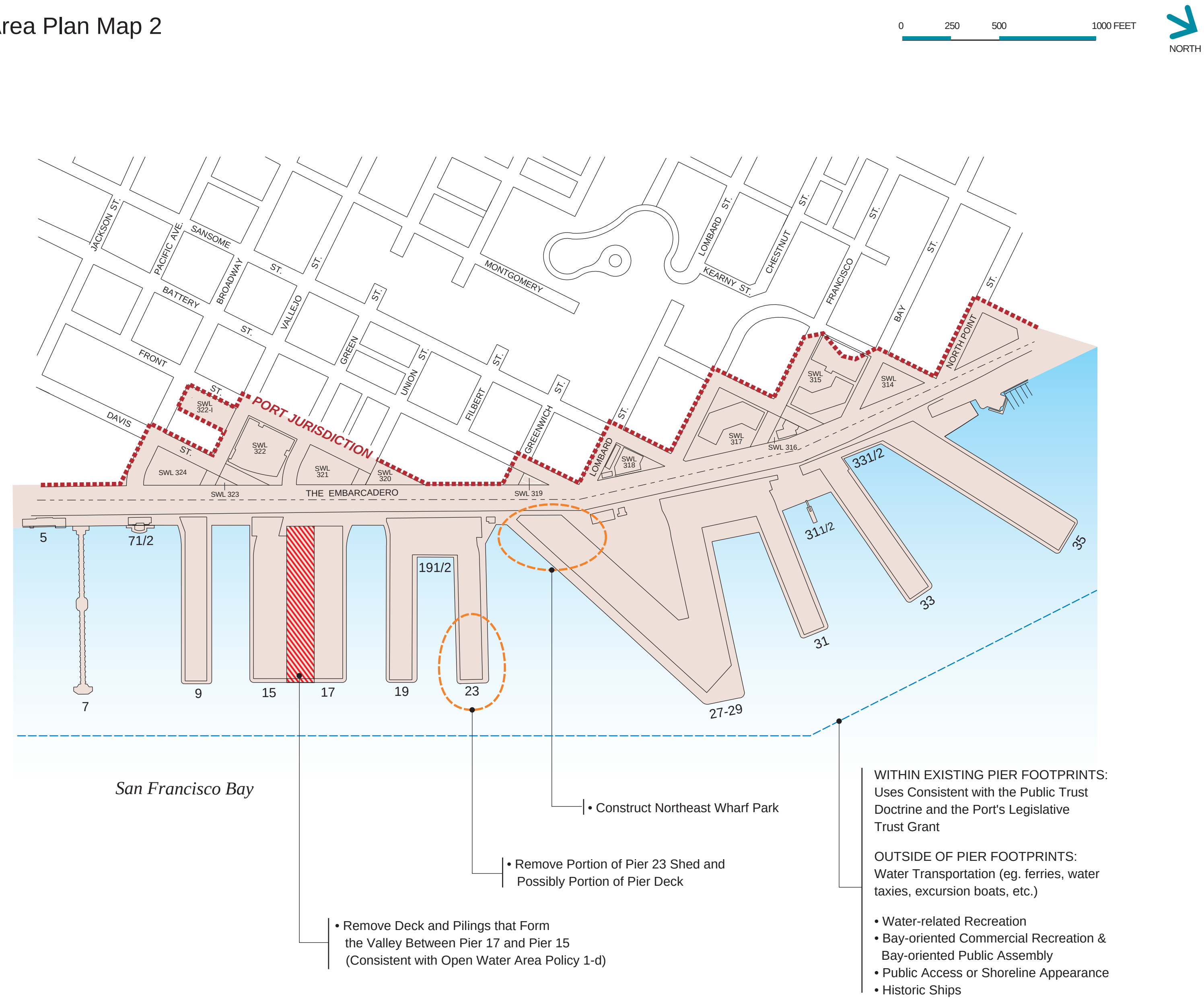
Special Area Plan Map 1

0 250 500 1000 FEET

NORTH



Special Area Plan Map 2



SFW SAP

Special Area Plan Map 3

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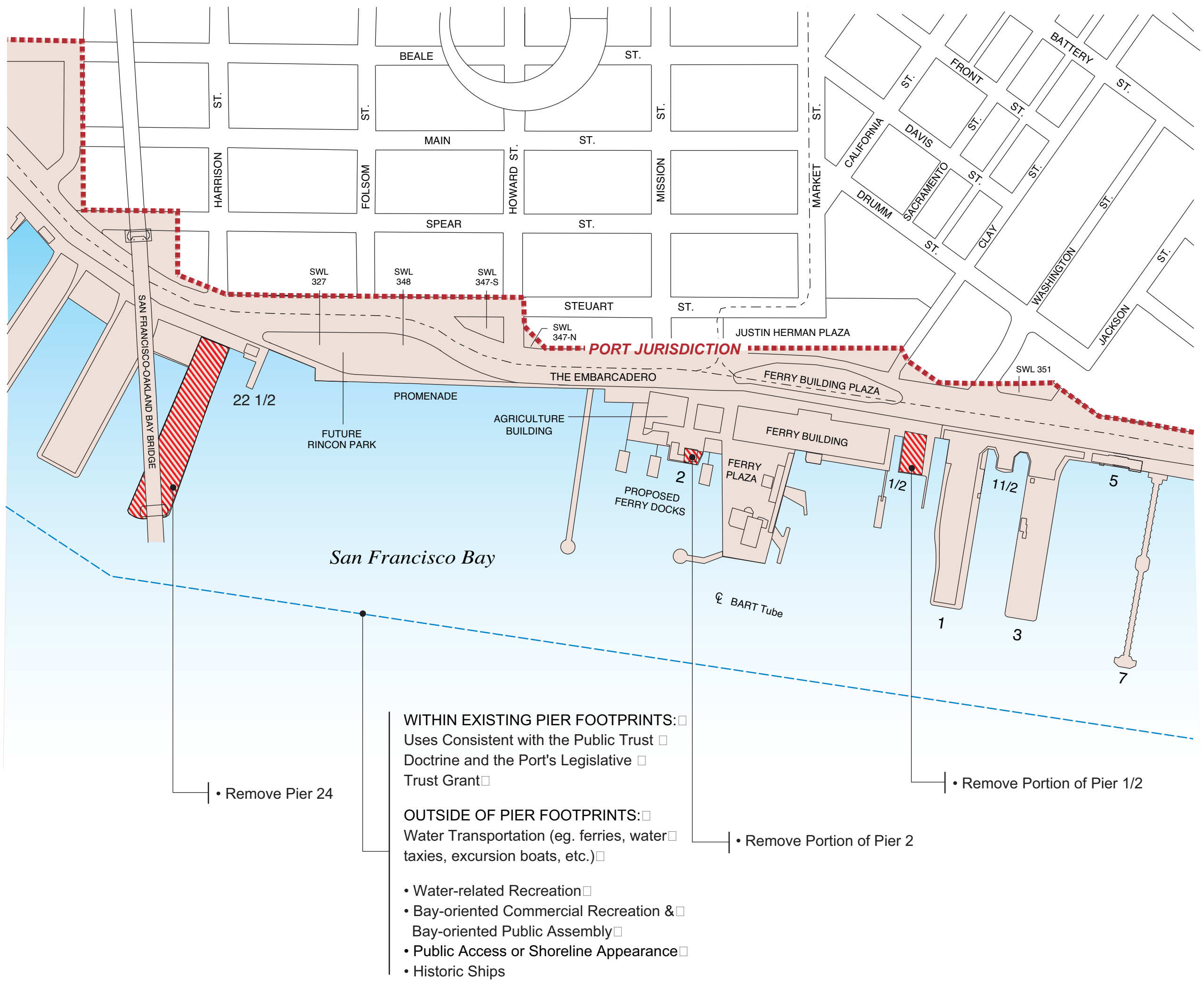
NORTH



SFW SAP Special Area Plan Map 4

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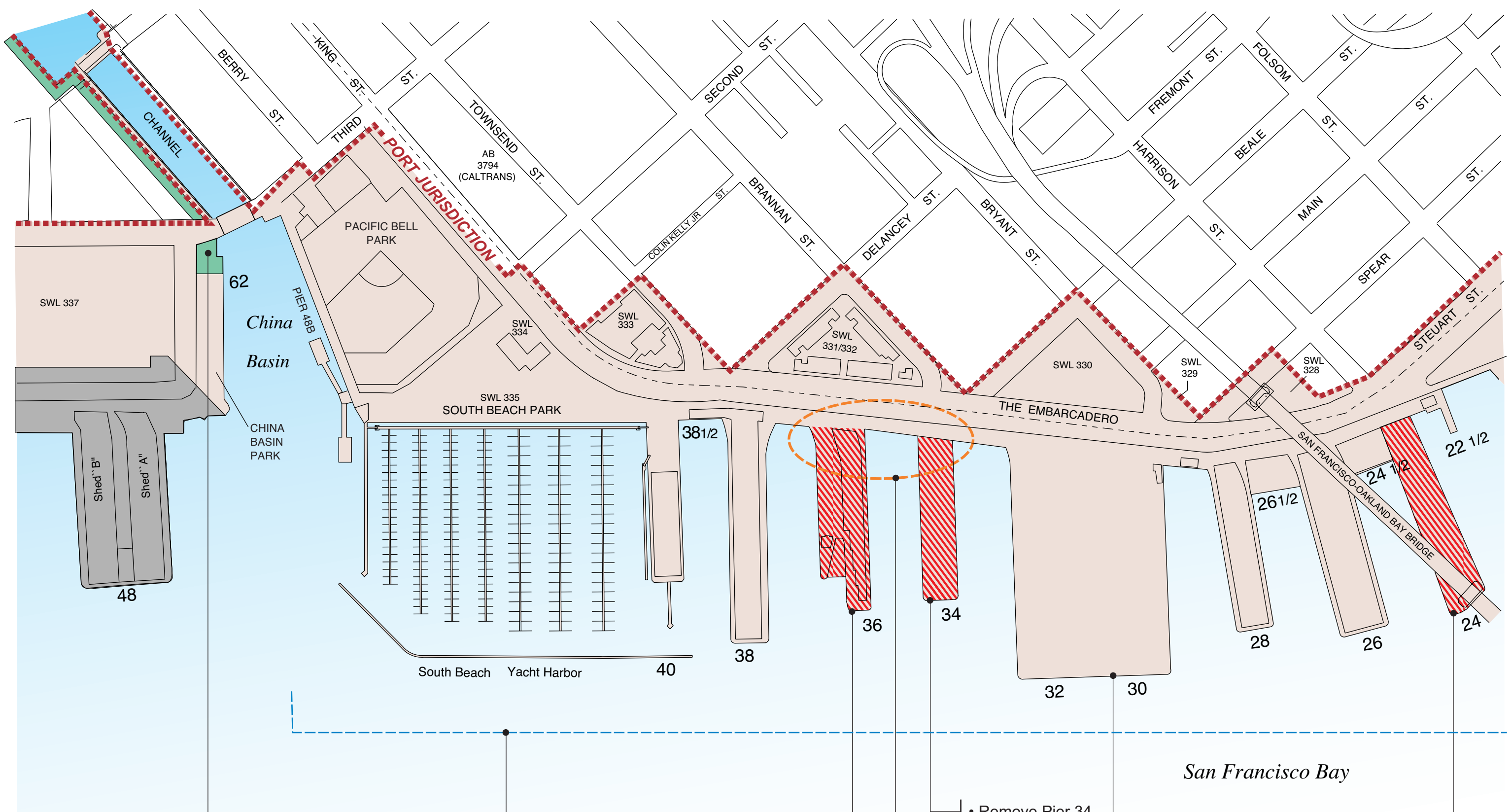
NORTH



CHINA BASIN AND CHANNEL
- Maritime
- Public Access
- Small Boat Docking Facilities

WITHIN EXISTING PIER FOOTPRINTS:
Uses Consistent with the Public Trust Doctrine and the Port's Legislative Trust Grant

OUTSIDE OF PIER FOOTPRINTS:
Water Transportation (eg. ferries, water taxies, excursion boats, etc.)

- Water-related Recreation
- Bay-oriented Commercial Recreation & Bay-oriented Public Assembly
- Public Access or Shoreline Appearance
- Historic Ships

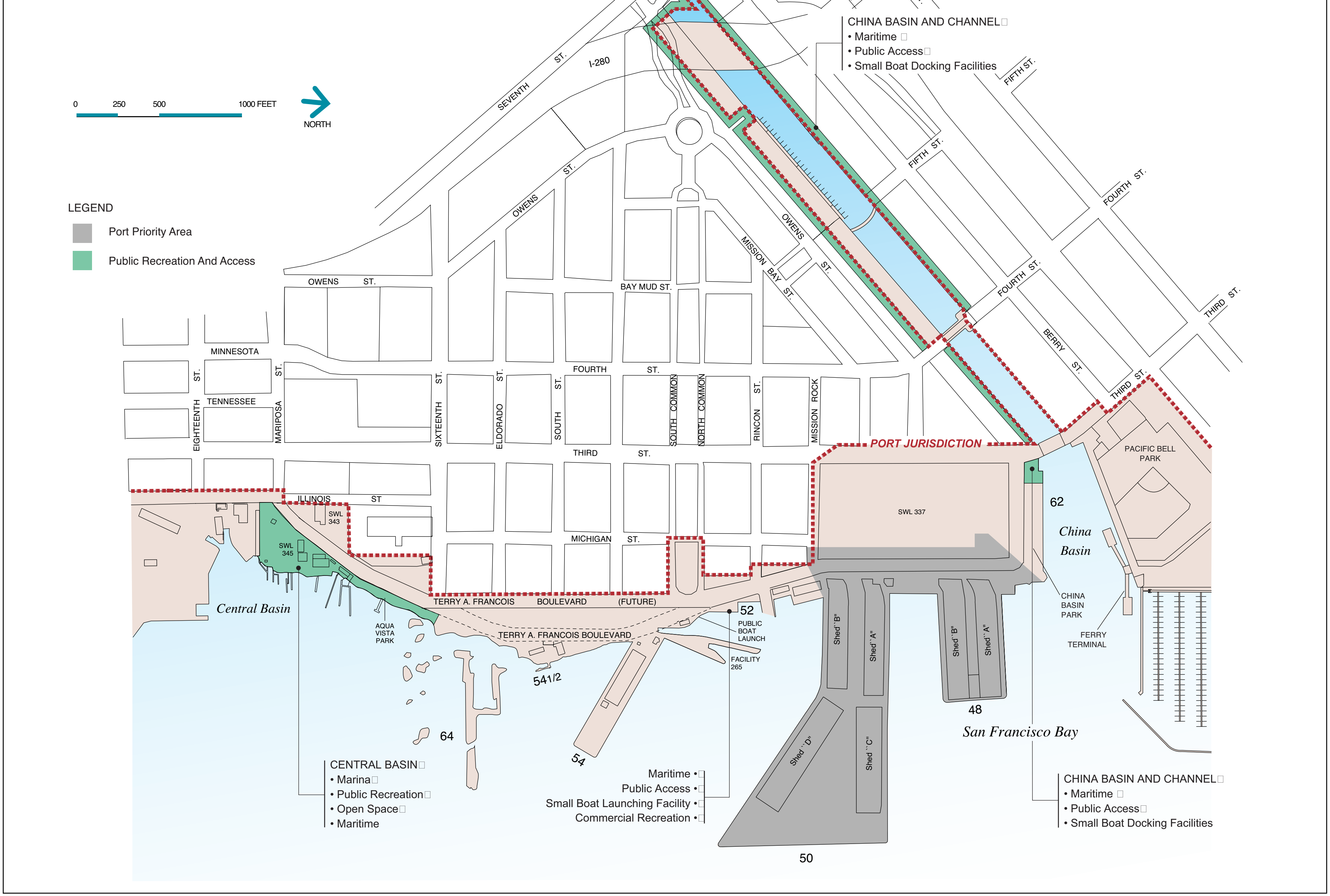
- Remove Pier 34
- Construct Brannan Street Wharf Park
- Remove Pier 36
- Some Fill for a Cruise Terminal May be Needed
- Remove Pier 24

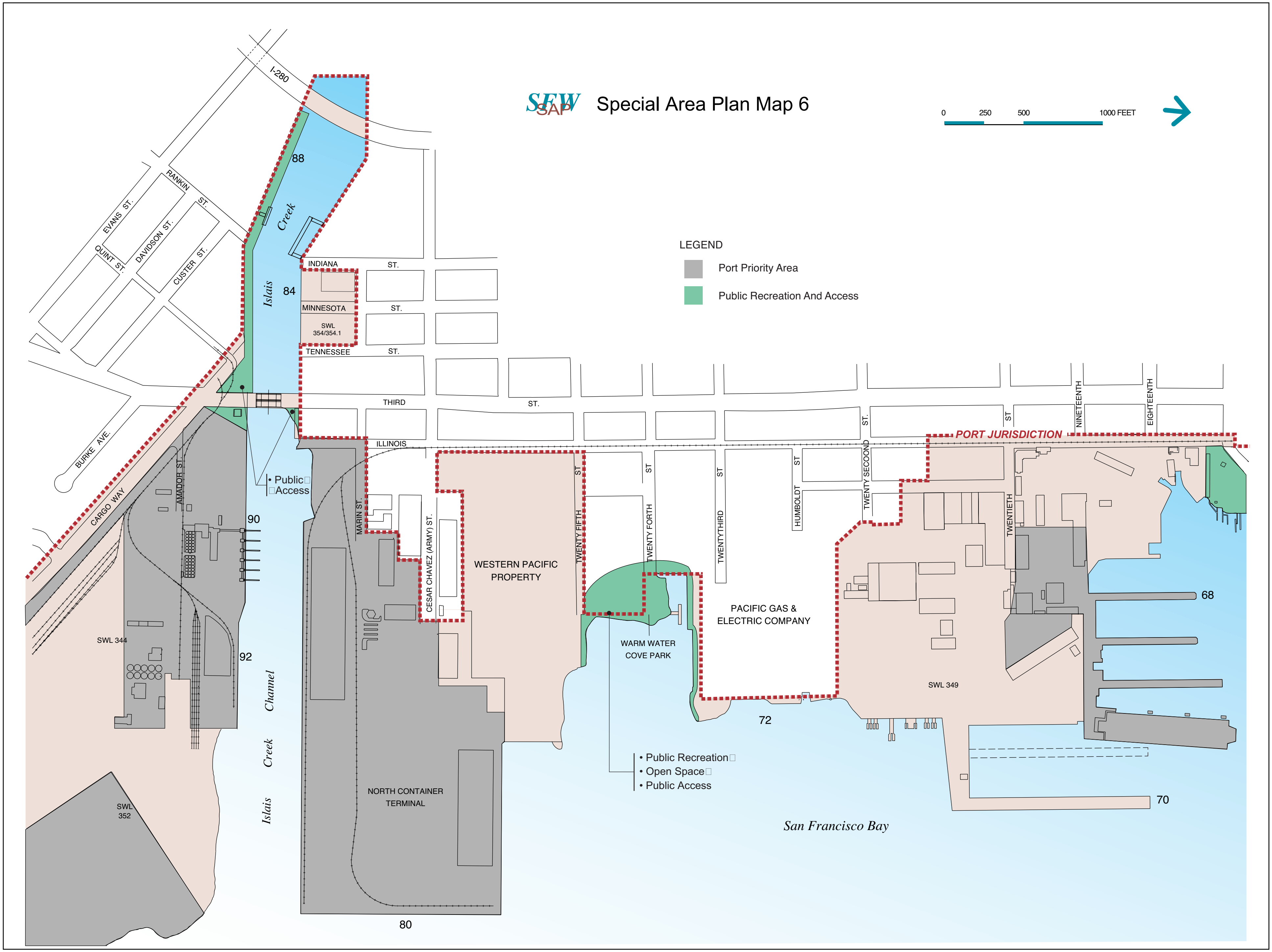
LEGEND

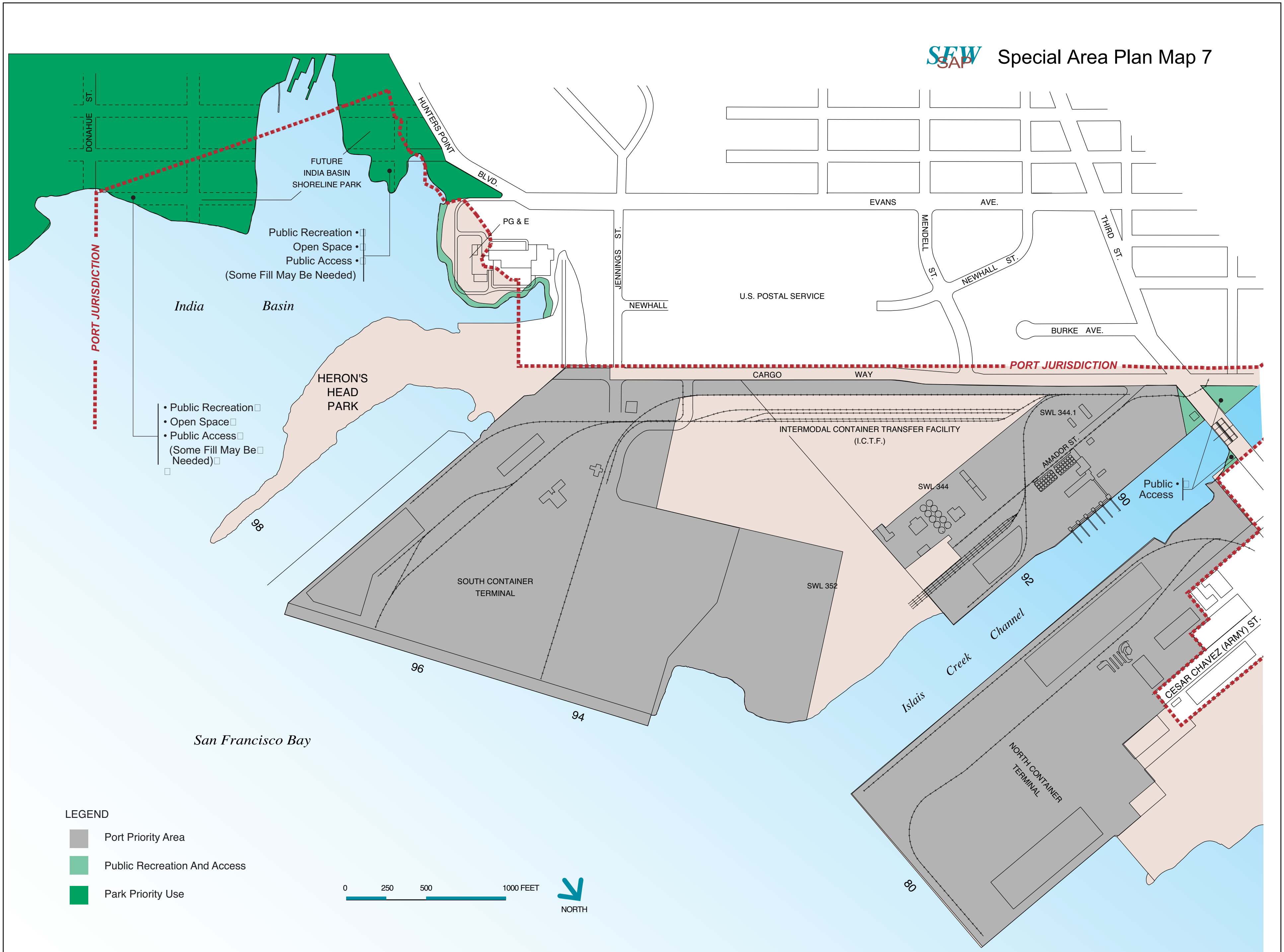
Port Priority Area

Public Recreation And Access

Special Area Plan Map 5




SFW SAP
Special Area Plan Map 6
0 250 500 1000 FEET
LEGEND
Port Priority Area
Public Recreation And Access
PORT JURISDICTION
I-280
RANKIN ST.
EVANS ST.
QUINT ST.
DAVIDSON ST.
CUSTER ST.
BURKE AVE.
CARGO WAY
AMADOR ST.
INDIANA ST.
MINNESOTA ST.
SWL 354/354.1
TENNESSEE ST.
THIRD ST.
ILLINOIS
MARIN ST.
CESAR CHAVEZ (ARMY) ST.
TWENTY FIFTH ST
TWENTY FORTH ST
TWENTYTHIRD ST
HUMBOLDT ST
TWENTY SECOND ST.
TWENTIETH ST
NINETEENTH
EIGHTEENTH
Islais Creek
Islais Creek Channel
• Public Access
88
84
90
92
80
72
68
70
SWL 344
SWL 352
SWL 349
NORTH CONTAINER TERMINAL
WESTERN PACIFIC PROPERTY
WARM WATER COVE PARK
PACIFIC GAS & ELECTRIC COMPANY
• Public Recreation
• Open Space
• Public Access
San Francisco Bay



SFW SAP
Special Area Plan Map 7
DONAHUE ST.
HUNTERS POINT BLVD.
FUTURE INDIA BASIN SHORELINE PARK
Public Recreation •
Open Space •
Public Access •
(Some Fill May Be Needed)
PORT JURISDICTION
India Basin
PG & E
JENNINGS ST.
NEWHALL
EVANS AVE.
MENDELL ST.
NEWHALL ST.
THIRD ST.
U.S. POSTAL SERVICE
BURKE AVE.
HERON'S HEAD PARK
• Public Recreation
• Open Space
• Public Access
(Some Fill May Be Needed)
CARGO WAY
SWL 344.1
INTERMODAL CONTAINER TRANSFER FACILITY (I.C.T.F.)
AMADOR ST.
SWL 344
Public • Access
98
90
92
SOUTH CONTAINER TERMINAL
SWL 352
Islais Creek Channel
CESAR CHAVEZ (ARMY) ST.
96
94
San Francisco Bay
NORTH CONTAINER TERMINAL
80
LEGEND
Port Priority Area
Public Recreation And Access
Park Priority Use
0 250 500 1000 FEET
NORTH

APPENDIX LU-2
San Francisco Bay Conservation and Development Commission's San Francisco Bay Plan Maps

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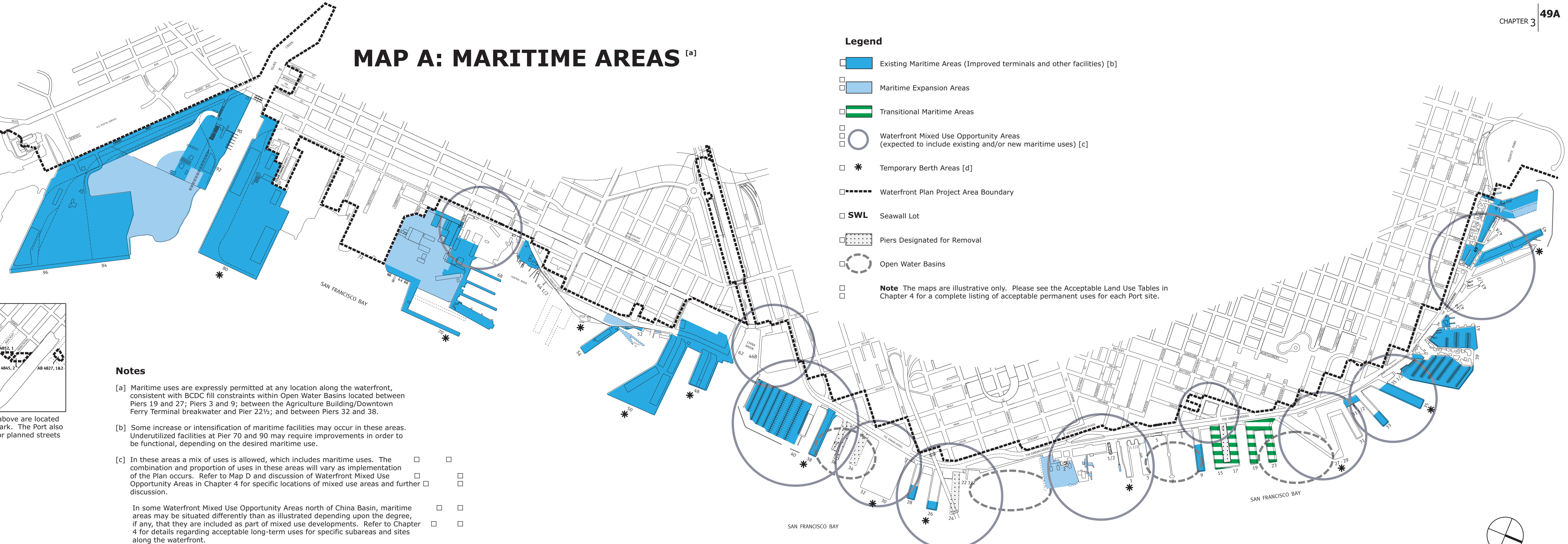
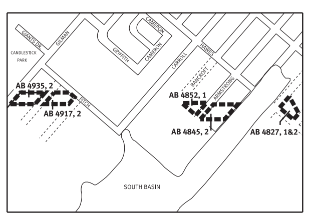
MAP A: MARITIME AREAS [a]



Legend

- Existing Maritime Areas (Improved terminals and other facilities) [b]
- Maritime Expansion Areas
- Transitional Maritime Areas
- Waterfront Mixed Use Opportunity Areas (expected to include existing and/or new maritime uses) [c]
- ✱ Temporary Berth Areas [d]
- Waterfront Plan Project Area Boundary
- **SWL** Seawall Lot
- Piers Designated for Removal
- Open Water Basins

Note The maps are illustrative only. Please see the Acceptable Land Use Tables in Chapter 4 for a complete listing of acceptable permanent uses for each Port site.



Note The parcels shown above are located just north of Candlestick Park. The Port also owns portions of existing or planned streets that are not depicted.

Notes

[a] Maritime uses are expressly permitted at any location along the waterfront, consistent with BCDC fill constraints within Open Water Basins located between Piers 19 and 27; Piers 3 and 9; between the Agriculture Building/Downtown Ferry Terminal breakwater and Pier 22½; and between Piers 32 and 38.

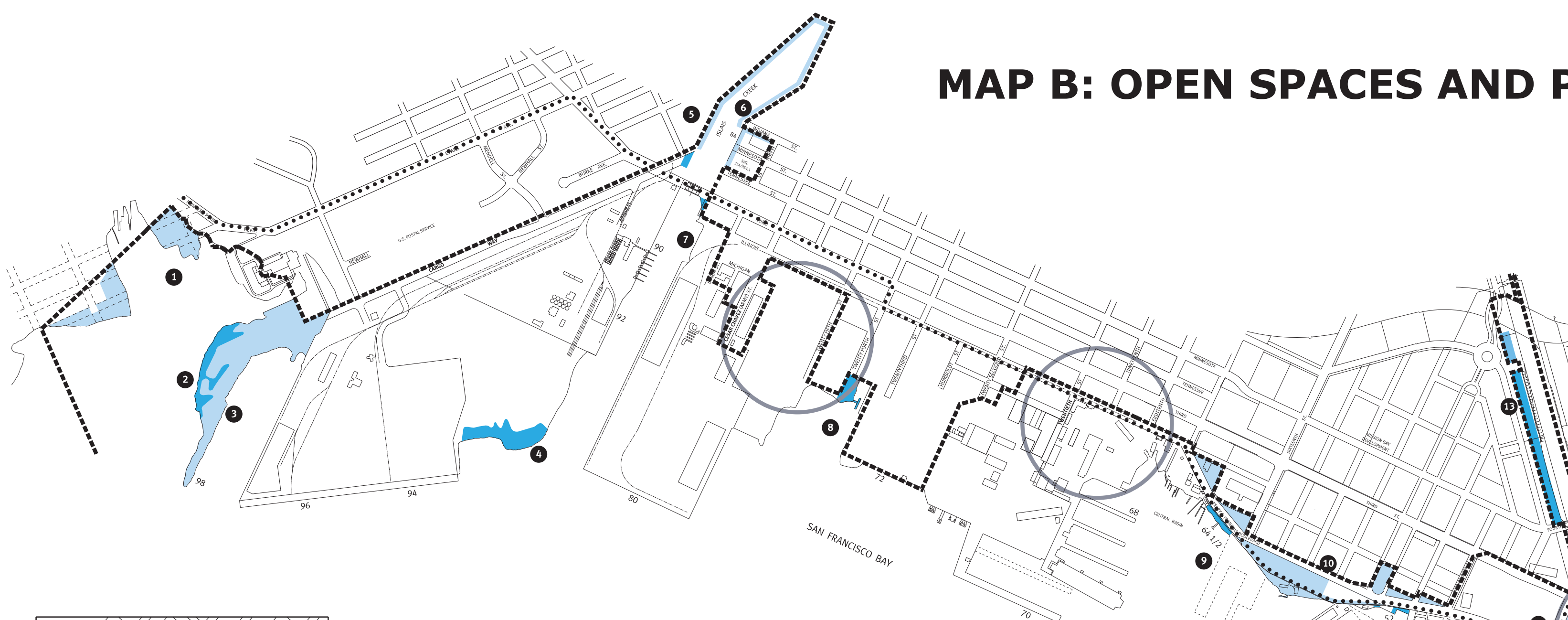
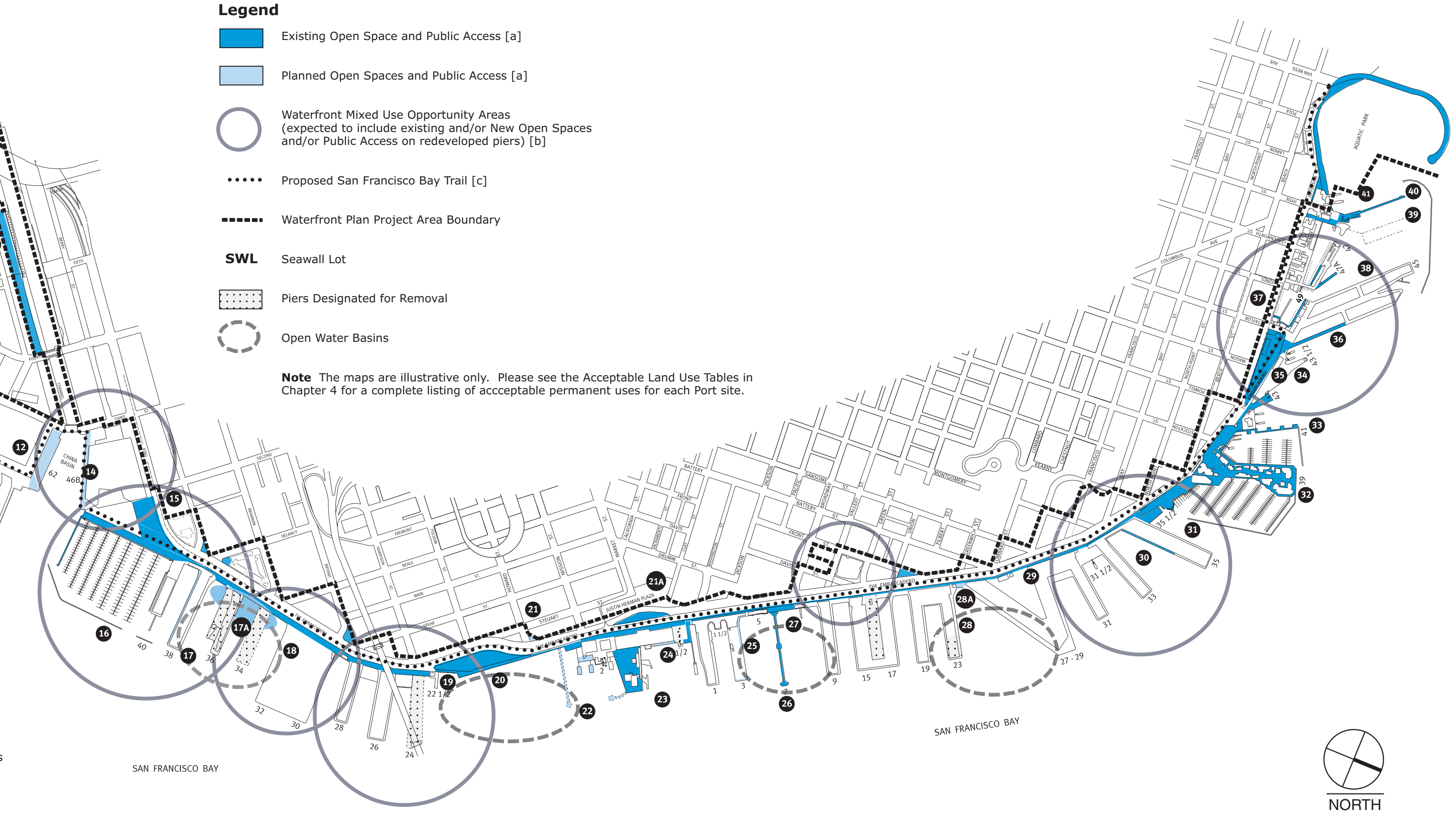
[b] Some increase or intensification of maritime facilities may occur in these areas. Underutilized facilities at Pier 70 and 90 may require improvements in order to be functional, depending on the desired maritime use.

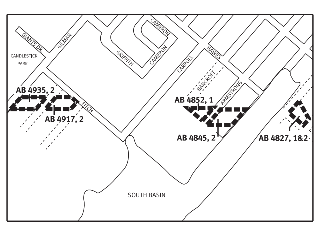
[c] In these areas a mix of uses is allowed, which includes maritime uses. The combination and proportion of uses in these areas will vary as implementation of the Plan occurs. Refer to Map D and discussion of Waterfront Mixed Use Opportunity Areas in Chapter 4 for specific locations of mixed use areas and further discussion.

In some Waterfront Mixed Use Opportunity Areas north of China Basin, maritime areas may be situated differently than as illustrated depending upon the degree, if any, that they are included as part of mixed use developments. Refer to Chapter 4 for details regarding acceptable long-term uses for specific subareas and sites along the waterfront.

[d] Temporary berthing occurs at various locations along the waterfront and is an acceptable use at most piers. Piers that are used most frequently for temporary berthing are designated with an asterisk.

MAP B: OPEN SPACES AND PUBLIC ACCESS



Note The parcels shown above are located just north of Candlestick Park. The Port also owns portions of existing or planned streets that are not depicted.

Notes

The PortWalk is continuous between China Basin and Pier 35 and links the open spaces and public access on this map.

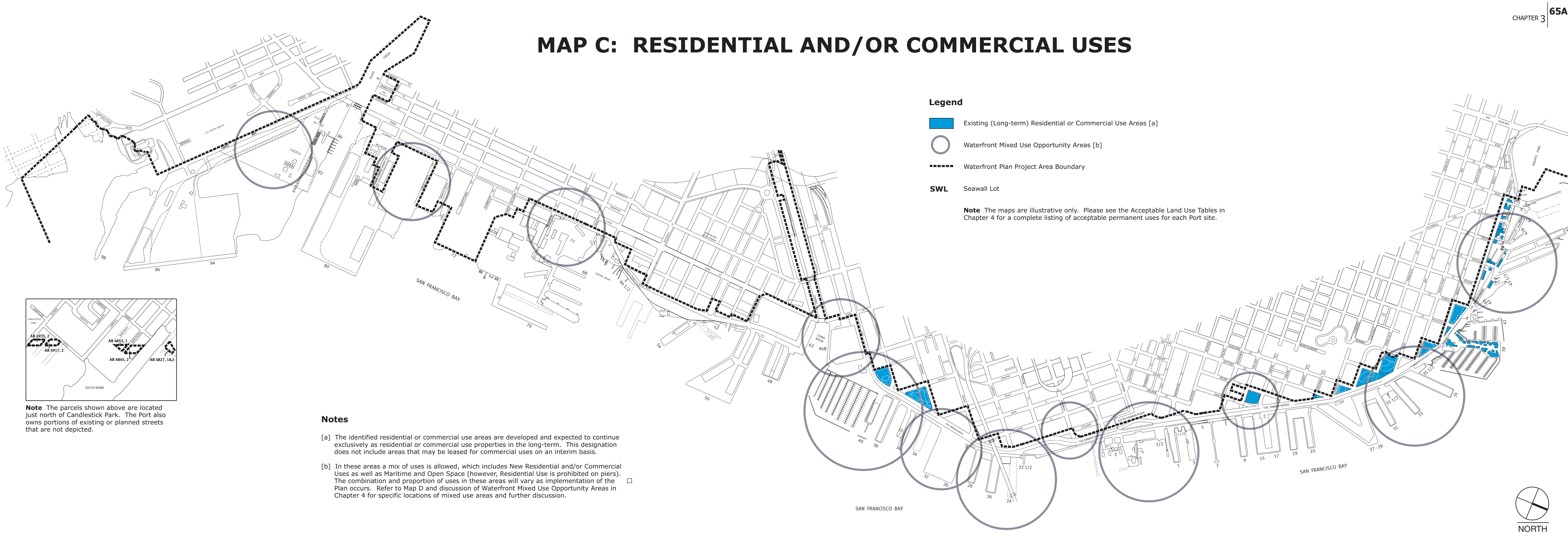
[a] Existing and Planned Open Space and Public Access (Planned Open Spaces and Public Access sites are italicized.)

1 *India Basin Shoreline Park*
2 Pier 98 - Existing wetlands
3 *Pier 98 - Planned wetlands enhancement and passive recreation park*
4 SWL 344 - Existing wetlands
5 Friends of Islais Creek public access improvements
6 *Department of Public Works and Friends of Islais Creek public access improvements*
7 Department of Public Works public access improvements
8 Warm Water Cove Park and fishing pier
9 Agua Vista Park
10 *Mission Bay Open Space*
11 Pier 52 Boat Launch and Service Engineering public access improvements
12 *South China Basin Park*
13 Mission Creek Harbor Association public access improvements
14 *Pacific Bell Ballpark shoreline public access*
15 South Beach Park
16 South Beach Yacht Harbor public access improvements
17 Pier 38 public access improvements
17A *Brannan Street Wharf and Open Water Basin*
18 South Embarcadero Promenade
19 Rincon Park
20 Embarcadero Promenade between Pier 22½ and The Agriculture Building, and Rincon Point Open Water Basin
21 SWL 347N Urban Plaza
21A *Ferry Building Plaza*
22 *Ferry Terminal public access improvements and partial removal of Pier 2*
23 Ferry Plaza public access improvements and ferry passenger terminal
24 Pier ½ public access improvements and partial pier removal
25 Ferry Boat Santa Rosa public access
26 Pier 7 public access and fishing pier and Broadway Open Water Basin
27 Waterfront Restaurant public access improvements
27A Views across open water between Piers 15 and 17
28 Pier 23 public access improvements
28A *Northeast Wharf Park and Open Water Basin*
29 North Embarcadero Promenade
30 Cruise terminal viewing deck at Pier 35
31 East Wharf Park
32 Pier 39 and Underwater World public access improvements
33 Pier 41 public access pier
34 Pier 43 and 43½ public access areas
35 *Fisherman's Wharf opportunity to develop a major plaza through a planning process*
36 Pier 45 public access near historic submarine "Pampanito"
37 Inner Lagoon boardwalk
38 Pier 47A public access
39 *Hyde Street Harbor access*
40 Hyde Street Pier historic ships
41 South End Rowing Club public sun deck

[b] In these areas a mix of uses is allowed, which includes public access and open space. The combination and proportion of uses in these areas will vary as implementation of the Plan occurs. Refer to Map D and discussion of Waterfront Mixed Use Opportunity Areas in Chapter 4 for specific locations of mixed use areas and further discussion.

[c] The proposed Bay Trail route may be relocated to nearby streets if further studies reveal conflicts with Port operations.

MAP C: RESIDENTIAL AND/OR COMMERCIAL USES



Legend

- Existing (Long-term) Residential or Commercial Use Areas [a]
- Waterfront Mixed Use Opportunity Areas [b]
- Waterfront Plan Project Area Boundary
- **SWL** Seawall Lot

Note The maps are illustrative only. Please see the Acceptable Land Use Tables in Chapter 4 for a complete listing of acceptable permanent uses for each Port site.

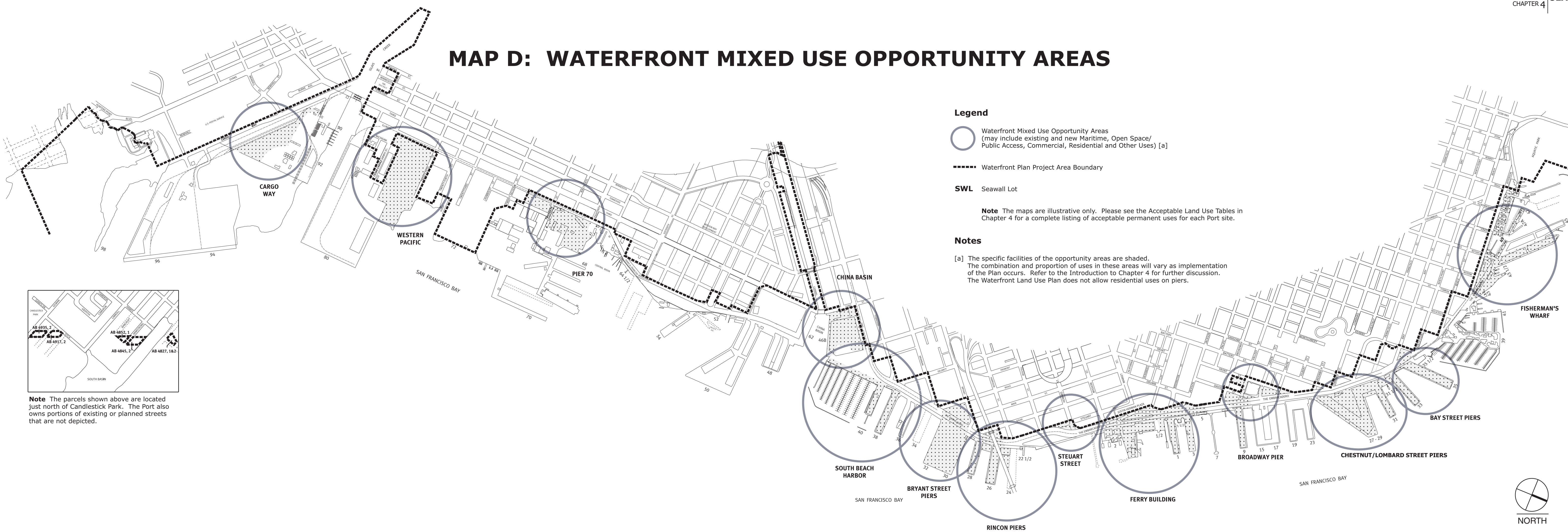
Note The parcels shown above are located just north of Candlestick Park. The Port also owns portions of existing or planned streets that are not depicted.

Notes

[a] The identified residential or commercial use areas are developed and expected to continue exclusively as residential or commercial use properties in the long-term. This designation does not include areas that may be leased for commercial uses on an interim basis.

[b] In these areas a mix of uses is allowed, which includes New Residential and/or Commercial Uses as well as Maritime and Open Space (however, Residential Use is prohibited on piers). The combination and proportion of uses in these areas will vary as implementation of the Plan occurs. Refer to Map D and discussion of Waterfront Mixed Use Opportunity Areas in Chapter 4 for specific locations of mixed use areas and further discussion.

MAP D: WATERFRONT MIXED USE OPPORTUNITY AREAS



Legend

Waterfront Mixed Use Opportunity Areas (may include existing and new Maritime, Open Space/ Public Access, Commercial, Residential and Other Uses) [a]

Waterfront Plan Project Area Boundary

SWL Seawall Lot

Note The maps are illustrative only. Please see the Acceptable Land Use Tables in Chapter 4 for a complete listing of acceptable permanent uses for each Port site.

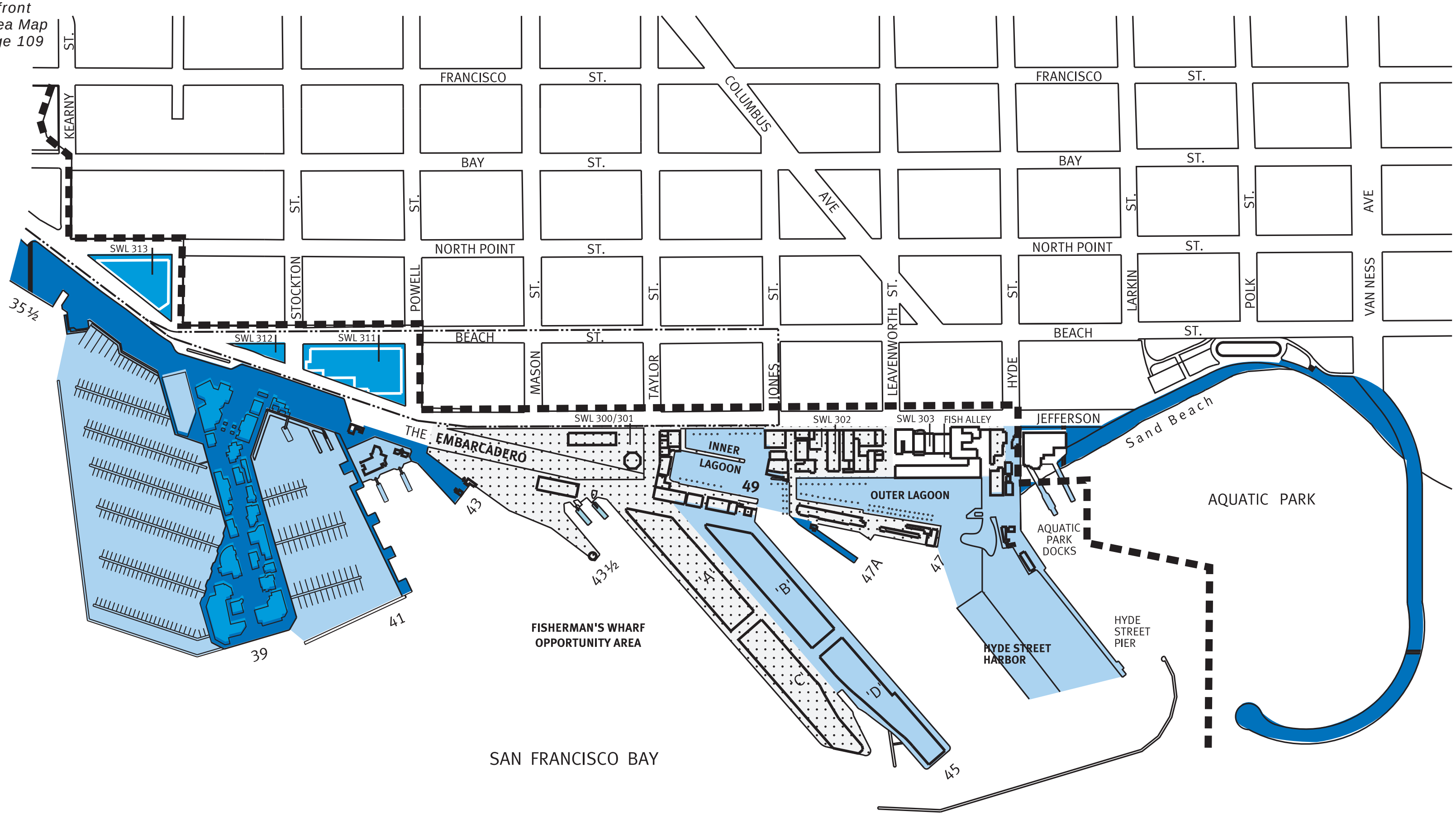
Notes

[a] The specific facilities of the opportunity areas are shaded.
The combination and proportion of uses in these areas will vary as implementation of the Plan occurs. Refer to the Introduction to Chapter 4 for further discussion.
The Waterfront Land Use Plan does not allow residential uses on piers.

Note The parcels shown above are located just north of Candlestick Park. The Port also owns portions of existing or planned streets that are not depicted.

THE FISHERMAN'S WHARF SUBAREA

(⟵) See Northeast Waterfront Subarea Map on page 109



LU2-7

Legend

- Waterfront Mixed Use Opportunity Areas [a]
- Other Maritime Areas
- Other Public Access & Open Space Areas
- Existing (Long Term) Commercial Area

[a] Waterfront Mixed Use Opportunity Areas include any underlying existing and acceptable maritime, public access and open space and commercial areas. See Acceptable Land Use Tables for more detail.

Map Notes

1 Facilities located along the marginal wharf between piers north of the Ferry Building are generally described by the numberr of the pier on the left followed by "½ ", e.g. Pier 43½ is located between Pier 43 & Pier 45.

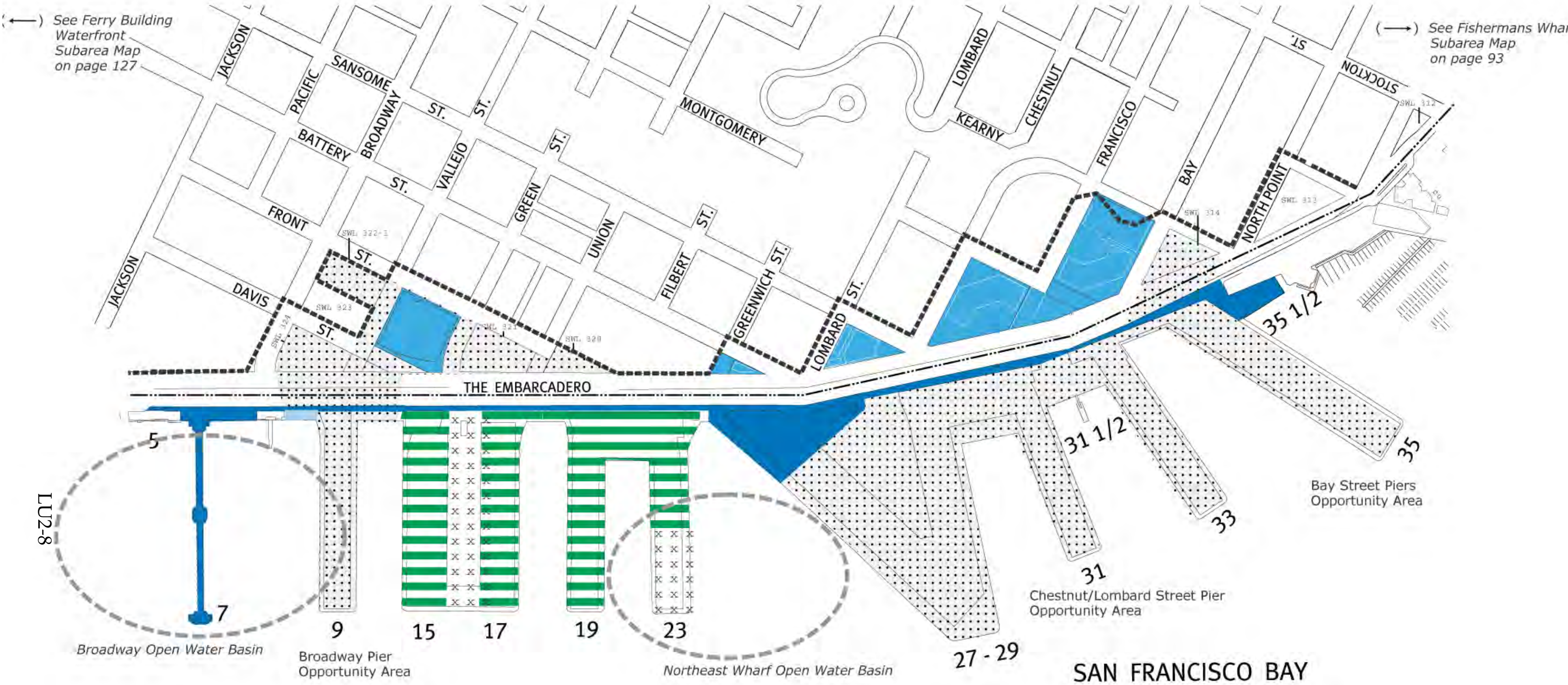
-··—·— San Francisco Municipal Railway (MUNI) 'F-Line': An extension of the F-Line from Market street north to Fisherman's Wharf, featuring the City's historic streetcar collection.

▪▪▪▪▪▪ Waterfront Plan Project Area Boundary

SWL Seawall Lot

2 The maps are illustrative only. Please see the Acceptable Land Use Tables in Chapter 4 for a complete listing of acceptable permanent uses for each Port site.

THE NORTHEAST WATERFRONT SUBAREA



Legend

- Waterfront Mixed Use Opportunity Areas [a]
- Transitional Maritime Areas
- Other Public Access & Open Space Areas
- Existing (Long Term) Commercial Area
- Piers Designated For Removal

[a] Waterfront Mixed Use Opportunity Areas include any underlying existing and acceptable maritime, public access and open space and commercial areas. See Acceptable Land Use Tables for more detail.

Map Notes

1 Facilities located along the marginal wharf between piers north of the Ferry Building are generally described by the number of the pier on the left followed by "½", e.g. Pier 31 ½ is located between Pier 31 & Pier 33.

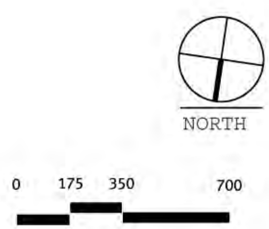
2 When the Waterfront (Embarcadero) Transportation Projects are completed, portions of certain streets abutting the Embarcadero will be vacated and included in adjacent seawall lots which are designated for potential new developments.

San Francisco Municipal Railway (MUNI) 'F-Line': An extension of the F-Line from Market street north to Fisherman's Wharf, featuring the City's historic streetcar collection.

Waterfront Plan Project Area Boundary

SWL Seawall Lot

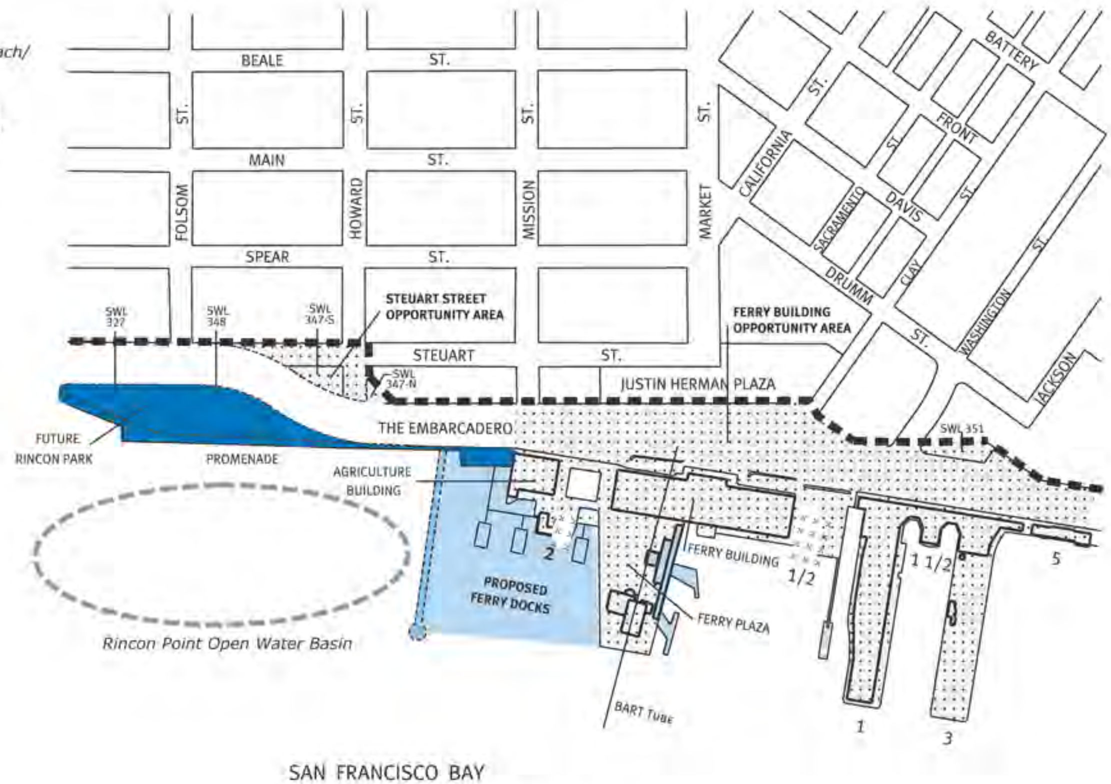
3 The maps are illustrative only. Please see the Acceptable Land Use Tables in Chapter 4 for a complete listing of acceptable permanent uses for each Port site.



THE FERRY BUILDING WATERFRONT SUBAREA

(⟵) See South Beach/ China Basin Waterfront Subarea Map on page 141A

(⟶) See Northeast Waterfront Subarea Map on page 109



Legend

Waterfront Mixed Use Opportunity Areas [a]

Other Maritime Areas

Other Public Access & Open Space Areas

Piers Designated for Removal

[a] Waterfront Mixed Use Opportunity Areas include any underlying existing and acceptable maritime, public access and open space and commercial areas. See Acceptable Land Use Tables for more detail.

Map Notes

1 Facilities located along the marginal wharf between piers north of the Ferry Building are generally described by the number of the pier on the left followed by "½", e.g. Pier 1½ is located between Pier 1 & Pier 3.

2 When the Waterfront (Embarcadero) Transportation Projects are completed, portions of certain streets abutting the Embarcadero will be vacated and included in adjacent seawall lots which are designated for potential new developments.

Waterfront Plan Project Area Boundary

SWL Seawall Lot

3 The maps are illustrative only. Please see the Acceptable Land Use Tables in Chapter 4 for a complete listing of acceptable permanent uses for each Port site.

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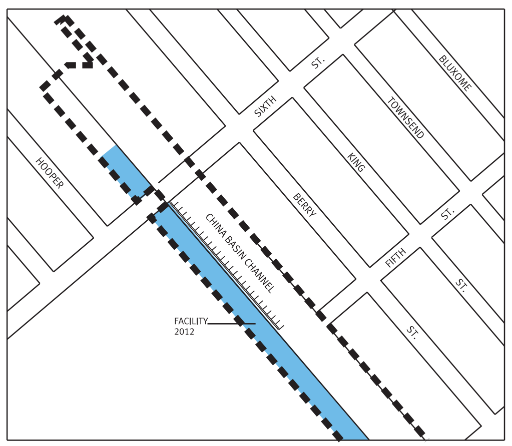
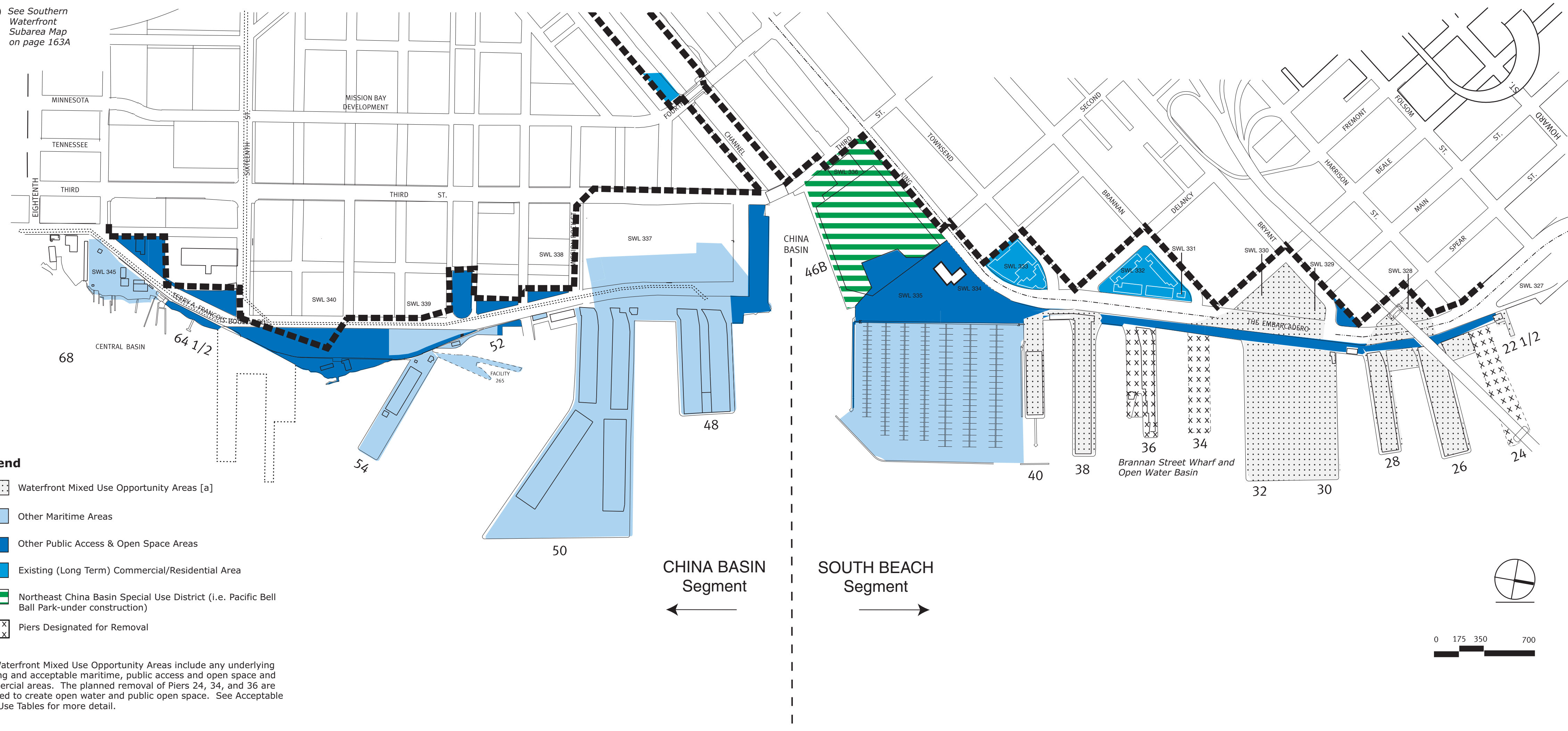
SOUTH BEACH / CHINA BASIN WATERFRONT SUBAREA





Map Notes

1 Facilities located along the marginal wharf between piers south of the Ferry Building are generally described by the number of the pier on the right followed by "½", e.g. Pier 26½ is located between Pier 28 & Pier 26.

2 Portions of Port seawall lots between the existing Mission Rock Street and Mariposa Street will be transferred to Catellus Development Corporation pursuant to certain land transfer agrements. The "transfer" parcels are excluded from the Waterfront Plan Project Area Boundary. Other parcels that will be leased from the Port to Catellus have been included because the Port will retain ownership of these sites.

- (North of China Basin) San Francisco Municipal Railway (MUNI) Metro Extension: A surface extension of the MUNI Metro subway light rail from Market Street south along The Embarcadero and King Street to Sixth Street and beyond.
- Freight Rail Line (Existing or Planned)
- Indicates condemned piers
- Waterfront Plan Project Area Boundary
- **SWL** Seawall Lot

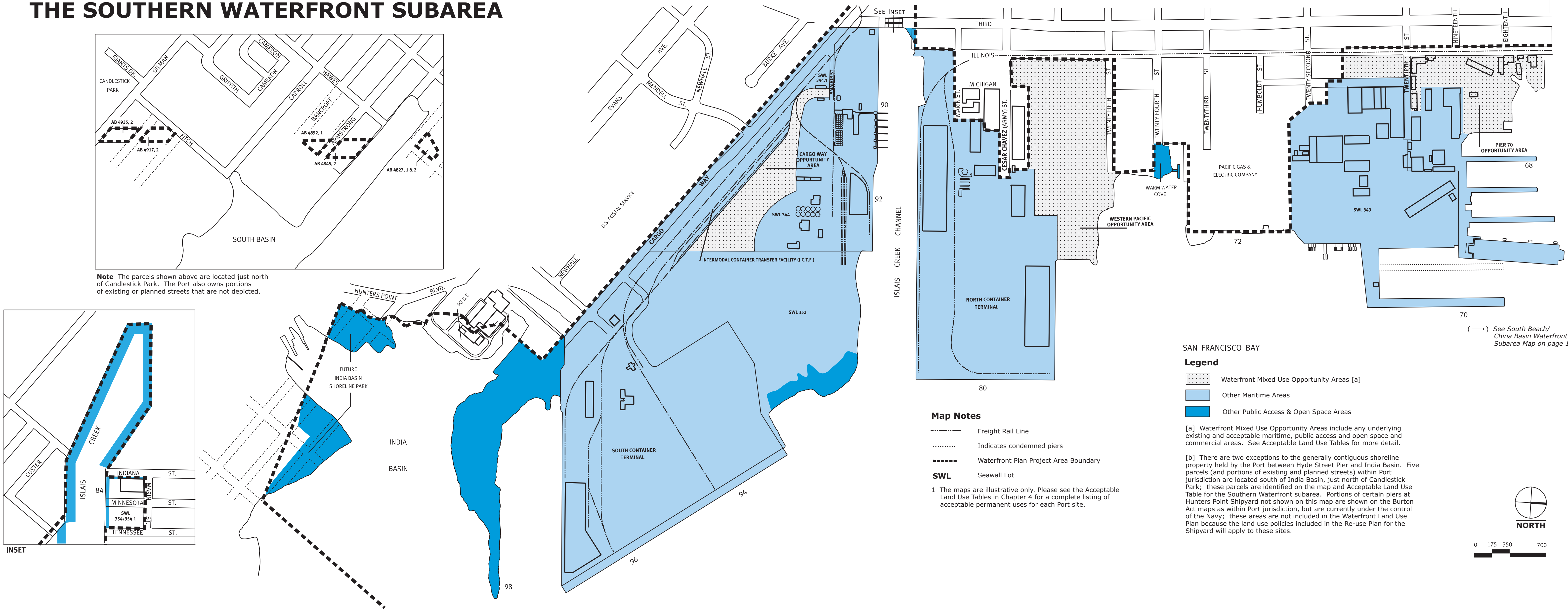
3 The maps are illustrative only. Please see the Acceptable Land Use Tables in Chapter 4 for a complete listing of acceptable permanent uses for each Port site.

Legend

- Waterfront Mixed Use Opportunity Areas [a]
- Other Maritime Areas
- Other Public Access & Open Space Areas
- Existing (Long Term) Commercial/Residential Area
- Northeast China Basin Special Use District (i.e. Pacific Bell Ball Park-under construction)
- Piers Designated for Removal

[a] Waterfront Mixed Use Opportunity Areas include any underlying existing and acceptable maritime, public access and open space and commercial areas. The planned removal of Piers 24, 34, and 36 are included to create open water and public open space. See Acceptable Land Use Tables for more detail.

THE SOUTHERN WATERFRONT SUBAREA



APPENDIX LU-3
City and County of San Francisco General Plan Land Use Designation Map

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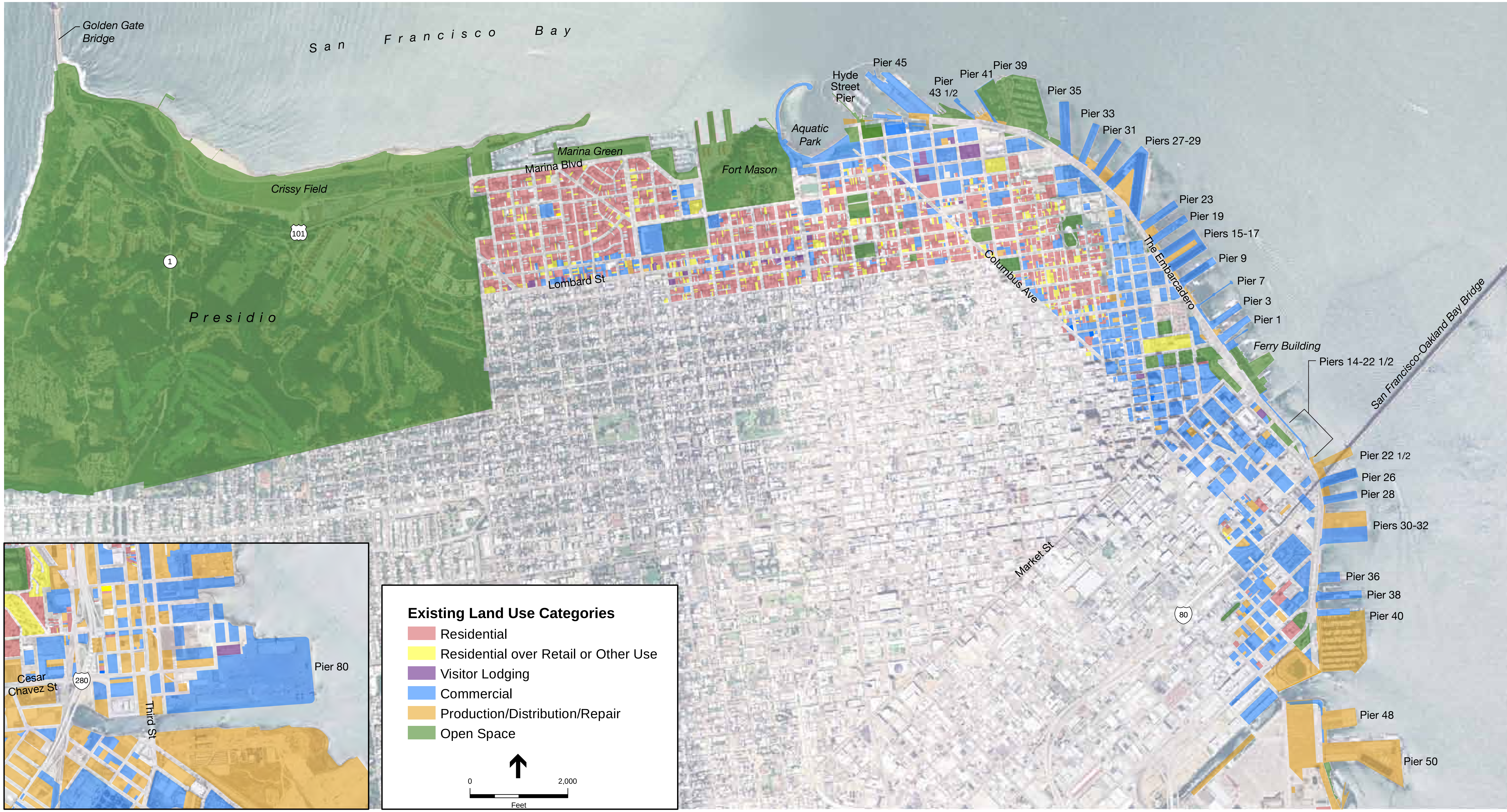

SOURCE: San Francisco Planning Department, 2005

Case No. 2010.0493E: AC34 / Cruise Terminal and Northeast Wharf Plaza (210317)

Appendix LU-3
Existing Generalized Land Uses in
Project Sites along San Francisco Waterfront

APPENDIX CP

Historical Resources Supporting Information

CP-1. Historic Resource Evaluation Response

CP-2. Design of International Cruise Terminal, Pier 27 Project Consistency with Secretary's Standards Memorandum (prepared by Architectural Resources Group, Inc. on June 6, 2011)

CP-3. Design Guidelines for Northeast Wharf Plaza, Pier 27 Project Consistency with Secretary's Standards Memorandum (prepared by Architectural Resources Group, Inc. on June 6, 2011)

CP-4. State of California, Department of Parks and Recreation Forms for Piers 80, 60, and 64

APPENDIX CP-1
Historic Resource Evaluation Response

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SAN FRANCISCO
PLANNING DEPARTMENT

MEMO

Historic Resource Evaluation Response

Environmental Planner: Joy Navarette
(415) 575-9040
joy.navarette@sfgov.org

Preservation Planner: Rich Sucré
(415) 575-9108
richard.sucre@sfgov.org

Project Address: **The 34th America's Cup and James R. Herman Cruise Terminal and Northeast Wharf Plaza**

Block/Lot: **Various**

Case No.: **2010.0493E**

Date of Review: July 1, 2011

PART I: HISTORIC RESOURCE EVALUATION

Based upon the research and evaluation prepared by the Port of San Francisco Preservation Staff and the environmental consultant and their subconsultants, Planning Department Preservation staff concurs with the list historic resources present within the project site associated with the 34th America's Cup and James R. Herman Cruise Terminal and Northeast Wharf Plaza (Proposed Project). This list of historic resources includes the following:

Resource Name	Period of Significance	Contributing Features
Fort Mason		
San Francisco Port of Embarkation, U.S. Army Historic Landmark District	1750–1949	45 buildings, 10 structures, 2 objects
Fort Mason Historic District	1750-1949	13 buildings, 5 structures
Alcatraz Historic District / Alcatraz National Historic Landmark	1824–1974	18 buildings, 28 structures
Port of San Francisco Embarcadero Historic District	1878–1946	24 buildings, 26 structures
Northeast Waterfront Historic District		
Fort Point National Historic Site	1850–1949	7 buildings, 5 structures
Presidio National Historic Landmark District	1750–1949	~778 buildings, structures, sites, and objects
Forts Baker, Barry and Cronkhite Historic District	1825–1949	~100 buildings and structures plus numerous related archeological resources and landscape features
Aquatic Park National Historic Landmark District	1900–1949	3 buildings, 5 structures
Marina Green, Seawall, and Concessionaire Stand	1915-1943	1 object, 2 structures

Resource Name	Period of Significance	Contributing Features
San Francisco Civic Center Historic District	1900–1974	9 buildings, 1 object
State Historical Landmark No. 623, Union Square	1850-1941	1 building, 1 object
Golden Gate Bridge	1937	1 structure
Angel Island Immigration Station National Historic Landmark	1910-1940	1 building
Yerba Buena Island Resources	1875–1949	4 buildings, 1 structure, 1 NRHP district
State Historical Landmark No. 987, Treasure Island	1936-1946	3 buildings

Additional information on the historic context and the character-defining features associated with the aforementioned historic resources is available within the "Cultural and Paleontological Resources" section of the Draft Environmental Impact Report for the Proposed Project.

CEQA HISTORIC RESOURCE DETERMINATION

☐ No Historic Resource Present

If there is no historic resource present, please have the Senior Preservation Planner review, sign, and process for the Environmental Planning Division.

☐ No Historic Resource Present, but is located within a California Register-eligible historic district

If there is a California Register-eligible historic district present, please fill out the *Notice of Additional Environmental Evaluation Review* and have the project sponsor file the **Part II: Project Evaluation** application fee directly to the Environmental Planning Division.

☒ Historic Resource Present

If a historic resource is present, please fill out the *Notice of Additional Environmental Evaluation Review* and have the project sponsor file the **Part II: Project Evaluation** application fee directly to the Environmental Planning Division.

PART I: SENIOR PRESERVATION PLANNER REVIEW

Signature: for

Tina Tam, *Senior Preservation Planner*

Date: 7/1/11

PART II: PROJECT EVALUATION

PROPOSED PROJECT

☒ Demolition ☐ Alteration ☒ New Construction

PROJECT DESCRIPTION

The Proposed Project is described in detail within the Draft Environmental Impact Report.

PROJECT EVALUATION

Planning Department Preservation staff has reviewed the project description and concurs with the project evaluation provided by the Port of San Francisco and the environmental consultant and their associated subconsultants. Department staff has worked closely within the Project Team to develop the analysis of the impacts to historic resources within the project site. Impacts upon archaeological resources are not addressed within this response.

Impact Summary
Provided below is a summary of the proposed project's impacts upon historic resources:

Impact-America's Cup
Construction and operation of the proposed AC34 project could cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5, including those resources listed in Article 10 or Article 11 of the San Francisco Planning Code. Staff has determined that this aspect of the proposed project will have a less than significant impact upon historic resources with the incorporation of Mitigation Measure M-CP-1a.

Impact-Cruise Terminal
Construction and operation of the proposed Pier 27 Cruise Ship Terminal would not result in a substantial adverse change in the significance of a historical resource. Staff has determined that this aspect of the proposed project will have a less than significant impact upon historic resources.

Impact-Northeast Wharf Plaza
Construction of the proposed Northeast Wharf Plaza could cause a substantial adverse change in the significance of a historical resource. Staff has determined that this aspect of the proposed project will have a less than significant impact upon historic resources with the incorporation of Mitigation Measure M-CP-6.

Impact-Northeast Wharf Plaza
Proposed fill removal within Port properties associated with amendments to the BCDC Special Area Plan for the cruise terminal and Northeast Wharf Plaza would not cause a substantial adverse change in the significance of a historical resource. Staff has determined that this aspect of the proposed project will not have an impact upon historic resources.

Impact-Long Term Development
Long-term development would result in redevelopment of existing Port properties at Piers 30-32, which could result in a significant impact to cultural resources. Staff has determined that this aspect of the proposed project will have a less than significant impact upon historic resources with the incorporation of Mitigation Measure M-LT-1a.

Impact-Long Term Development
Long-term development would result in redevelopment of existing Port properties within the Embarcadero Historic District, which could result in a significant impact to cultural resources. Staff has determined that this aspect of the proposed project will have a less than significant impact upon historic resources with the incorporation of Mitigation Measure M-CP-1a.

Cumulative Impact
The combination of AC34, including 2012 and 2013 events, and the Cruise Ship Terminal projects, in combination with other past, present and foreseeable future projects, could have a cumulatively considerable effect on cultural resources. Staff has determined that this aspect of the proposed project will have a less than significant cumulative impact upon historic resources with the incorporation of Mitigation Measures M-CP-1a, M-CP -6, and MT-LT-CP.

Details upon the impact analysis are provided within the Draft Environmental Impact Report.

Mitigation
In order to lessen and/or mitigate the significant adverse impacts on the historic resources present within the project site, the proposed project would incorporate the following mitigation measures:

- Mitigation Measure M-CP-1a. Bulkhead Wharf Substructure Review Process
- Mitigation Measure M-CP-1b: Protection of Historical Resources due to Indirect Damage
- Mitigation Measure M-CP-1c: Protection of Historical Resources due to Direct Damage
- Mitigation Measure M-CP-1d: Protection of the Northeast Waterfront Historic District from Teatro Zinzanni Relocation
- Mitigation Measure M-CP-6: Northeast Wharf Plaza Performance Criteria
- Mitigation Measure M-LT-CP
    - *Archeological Testing, Monitoring, Data Recovery and Reporting*
    - *Review of New Construction within the Port of San Francisco Embarcadero Historic District for Compliance with the Secretary's Standards*
    - *Documentation and Interpretation for Demolition or Alteration of Buildings*

  a) *Piers 30-32 Performance Criteria*

  b) *Performance Criteria for Long-Term Development on Historic Piers*

Planning Department Preservation staff assisted in drafting these mitigation measures, which are described in full within the Draft Environmental Impact Report.

PART II: SENIOR PRESERVATION PLANNER REVIEW

Signature: ______ For ______ Date: 7/1/11

Tina Tam, *Senior Preservation Planner*

cc: Linda Avery, *Recording Secretary*, Historic Preservation Commission
Virnaliza Byrd / Historic Resource Impact Review File
Beth Skrondal / Historic Resource Survey Team
I:\DECISION DOCUMENTS\HRER

SC: G:\Documents\2010.0493E America's Cup\HRER_America's Cup_2011-07-01.doc

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APPENDIX CP-2

Design of International Cruise Terminal, Pier 27 Project Consistency with Secretary's Standards Memorandum (prepared by Architectural Resources Group, Inc. on June 6, 2011)

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ARCHITECTURAL RESOURCES GROUP, INC.
Architects, Planners & Conservators

MEMORANDUM

To: Mark Paez
Preservation Planner
Port of San Francisco
Pier 1, The Embarcadero
San Francisco, CA 94111

Project: International Cruise Terminal & Northeast Wharf Plaza, Pier 27
San Francisco, CA

Project #: 11065

Date: June 6, 2011

Phone: 415-705-8674

Via: e-mail

Re: Design of International Cruise Terminal, Pier 27
Project Consistency with *Secretary's Standards*

1. Introduction

In response to your request, Architectural Resources Group (ARG) has completed this assessment of the proposed design for the International Cruise Terminal at Pier 27 for consistency with the *Secretary of the Interior's Standards for Rehabilitation*. The proposed project includes removal of the existing Pier 27 building and replacement with a new cruise ship terminal. ARG conducted its assessment of the proposed terminal based on information provided by the project architects, KMD Architects and Pfau Long Architecture, specifically:

- "Pier 27 Northeast Wharf Plaza & International Terminal Presentation, PowerPoint Presentation to the San Francisco Planning Department and Port of San Francisco Illustrating Project Concepts and Design of Plaza and Terminal Building," San Francisco, California, 8 April 2011.

- "Supplemental Photographs & Drawings provided to Architectural Resources Group," San Francisco, California, 8-14 April 2011 and 2-8 May 2011.

Several images from these sources are included below in a photo appendix.

At the request of the Port of San Francisco, ARG completed a historic resources report for Piers 27, 29 and 31 in September 1999. For each of the structures on site, the report included an historical overview, a building description, and a conditions analysis, as well as specification of character-defining features and additions or alterations. Further research conducted 2003-2005 on properties along San Francisco's waterfront resulted in the nomination and designation of the Port of San Francisco Embarcadero

National Register Historic District (Historic District) in May 2006. The nomination includes information on the resources and the Historic District that are the subject of this memorandum.

Pier 27 is a non-contributor to the Port of San Francisco Embarcadero Historic District because it was built in the mid-1960s, outside the district's period of significance. Nor does Pier 27 appear to be eligible for listing on the National Register of Historic Places as an individual resource. The pier is less than 50 years old and does not possess sufficient architectural or historical significance to be a contributor to the historic district or an individually eligible resource.

At the request of the Port of San Francisco, ARG reviewed and updated the 1999 Historic Resources Report in March 2011. That revised report describes the resources within the project area and is the basis for the historic narrative supporting this report. The historical status of the structures that are the subject of the memorandum is as follows:

- The Port of San Francisco Embarcadero National Register Historic District includes an approximately three-mile curving stretch of San Francisco's northeastern waterfront from Pier 45 at Fisherman's Wharf, south to Pier 48 at China Basin. The district includes pier structures, other waterfront structures such as the Ferry Building, as well as the waterside portion of the Embarcadero corridor including the Seawall, Herb Caen Way/Embarcadero Promenade and the Bulkhead Wharf. Most of the district resources were constructed between 1908 and 1938, though the construction of the seawall and Ferry Building dates from the 1890s.

- Pier 27 is a non-contributor to the Port of San Francisco Embarcadero Historic District because it was built in the mid-1960s, outside the district's period of significance.

- The Pier 27 Annex (also known as the Pier 29 Office Building) is a non-contributing resource to the district. Built in 1962 the building is less than fifty years of age and is outside the period of significance identified for the historic district.

- The Pier 29 Annex (Belt Line Railroad Building) is a contributor to the Port of San Francisco Embarcadero National Register Historic District.

- Pier 29 is a contributor to the Port of San Francisco Embarcadero National Register Historic District.

In conjunction with this assessment of the proposed design of the International Cruise Terminal, ARG has completed a separate memorandum evaluating the proposed design of the Northeast Wharf Plaza for consistency with the *Secretary's Standards*. The Northeast Wharf Plaza portion of the project entails removal of the Pier 27 Annex, removal of the temporary tent structures and prefabricated buildings that house Teatro Zinzanni, and construction of a 2.5-acre open space along with three freestanding park structures and one restaurant.

2. The Secretary of the Interior's Standards for Rehabilitation

The Secretary of the Interior is responsible for establishing standards for all programs under Departmental authority and for advising Federal agencies on the preservation of historic properties listed in or eligible for listing in the National Register of Historic Places. The *Standards for Rehabilitation* (codified in 36 CFR 67 for use in the Federal Historic Preservation Tax Incentives program) address the most prevalent treatment. "Rehabilitation" is defined as "the process of returning a property to a state of utility, through repair or alteration, which makes possible an efficient contemporary use while preserving those portions and features of the property which are significant to its historic, architectural, and cultural values."

Initially developed by the Secretary of the Interior to determine the appropriateness of proposed project work on registered properties within the Historic Preservation Fund grant-in-aid program, the *Standards for Rehabilitation* (the *Standards*) have been widely used over the years—particularly to determine if a rehabilitation qualifies as a Certified Rehabilitation for Federal tax purposes. In addition, the *Standards* have guided Federal agencies in carrying out their historic preservation responsibilities for properties in Federal ownership or control; and State and local officials in reviewing both Federal and nonfederal rehabilitation proposals. They have also been adopted by historic district and planning commissions across the country.

The intent of the *Standards* is to assist the long-term preservation of a property's significance through the preservation of historic materials and features. The *Standards* pertain to historic buildings of all materials, construction types, sizes, and occupancy and encompass the exterior and interior of the buildings. They also encompass related landscape features and the building's site and environment, as well as attached, adjacent, or related new construction. To be certified for Federal tax purposes, a rehabilitation project must be determined by the Secretary of the Interior to be consistent with the historic character of the structure(s), and where applicable, the district in which it is located. The Standards are to be applied to specific rehabilitation projects in a reasonable manner, taking into consideration economic and technical feasibility.

The ten Rehabilitation Standards and an evaluation of the project's consistency with each standard follow in Section 5 of this memorandum.

3. Construction Background

The substructure, transit shed and bulkhead building at Pier 29 were completed in 1916, 1917 and 1918, respectively. The Pier 27 substructure was completed in 1965, the bulkhead building was completed 1965-1966, and the shed was completed 1966-1967. The 1960s Pier 27 replaced two wooden piers: Piers 25 & 27. Pier 25, which dated from the early 1900s, along with its Neoclassical style bulkhead building, constructed in 1920, were demolished in 1965 in preparation for the construction of the current Pier 27 pier and shed. The former Pier 27, which dated from the 1890s, was removed in 1948.

The construction of Pier 27 in 1965 caused significant alterations to Pier 29. To enable the outshore end of Pier 29 to open directly into Pier 27, the reinforced concrete wall at the outshore end of Pier 29 and several bays along the south wall of the Pier 29 shed were removed. At the same time, Pier 29's substructure was extended to accommodate the end of Pier 27, and steel framing was added to the northern end of Pier 29 where it joined Pier 27. In addition, the area south of Pier 29 was filled in to support a triangular asphalt parking lot and driveway in the space between the two piers.

The Pier 27 Annex (also known as the Pier 29 Office Building) appears to have been constructed in 1962. Conflicting Port records indicate the building was associated with both Pier 27 and Pier 29. Built as offices, it remains in office use. There remains some uncertainty whether any portion of the former Pier 27 Bulkhead is a part of this structure.

The Pier 29 Annex (Belt Line Railroad Building) was originally constructed in 1909 near what is now Pier 3. Constructed as one of a pair of buildings, this Mission Style office building with Craftsman and Prairie style features was moved to its current site in 1918. It was put into service in January 1919 and served as offices and employee facilities in support of the Belt Line Railroad Engine House located directly across from the site, on the south side of the Embarcadero at Seawall Lot 319. The property was transferred to Kyle Railroads and then to the Port of San Francisco. Since 1973 the Port of San Francisco has leased the building to various tenants.

4. Project Description

The proposed International Cruise Terminal will sit within the footprint of the non-historic Pier 27 pier shed, which will be demolished. The new building is narrower and less than half the length of the existing shed. The building will sit 225 feet back from the edge of the Embarcadero, within the "working waterfront" zone of the Historic District.

The design of the building consists of a cargo-oriented lower floor, and a pedestrian oriented lobby and upper floor. The lower floor will have a large, open floor plate accommodating baggage handling within and ship provisioning on the apron outside. The east wall of this floor will include several large roll-up doors and person doors along the apron and will be clad in painted metal or concrete horizontal siding. This exterior cladding will consist of a smooth-textured, matte-finish panel system. The roll-up doors will match the finish and color of the adjacent walls.

Two volumes will be layered on top of these "working waterfront" elements, including a two-story lobby at the south end of the building and a linear volume along the top of the building. These spaces will accommodate pedestrian circulation and will be characterized by large expanses of clear glazing. Fritted glass or metal screens will be incorporated at the first story of the lobby to strengthen the terminal's visual base. The outshore end of the building will be developed in two phases. In the first phase, the northern terminus of the building will consist of an uncovered service area enclosed by an open aluminum fence up to ten feet in height. In phase two, this portion will be built out as an extension of the cargo-oriented first floor.

The building roof will consist of a single-ply, rolled roof broken into two separate portions of slightly varied slope. This roof will accommodate a future series of solar panels.

5. Project Assessment

This memorandum concludes with an evaluation of the proposed design of the International Cruise Terminal for consistency with each of the *Secretary of the Interior's Standards for Rehabilitation*. As described below, the proposed design appears to be in conformance with the *Secretary's Standards*.

Standard 1. *A property shall be used for its historic purpose or be placed in a new use that requires minimal change to the defining characteristics of the building and its site and environment.*

The proposed removal of the existing Pier 27 building and construction of the International Cruise Terminal appears to retain the character of the waterfront historic district. The Cruise Terminal will maintain the maritime use of the property by continuing the existing use of handling cargo and provisioning for the cruise industry.

Standard 2. *The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.*

The proposed removal of the existing Pier 27 building will require the rationalization (including removal of some historic materials) of the fragmented end of historic Pier 29. A design treatment for Pier 29 following the removal of Pier 27 has been proposed. ARG evaluated this proposal (in a separate memo dated April 13, 2011) and found it consistent with the *Secretary's Standards*.

The proposed removal of the existing Pier 27 building does not entail removal or alteration of any other historic materials, features or spaces. Pier 27 is a non-contributing feature of the Embarcadero Historic District, as it was built outside the district's period of significance. Nor does Pier 27 appear to be eligible for listing on the National Register of Historic Places as an individual resource. The pier is less than 50 years old and does not possess sufficient architectural or historical significance to be a contributor to the historic district or an individually eligible resource. As a result, Pier 27's proposed demolition is not in conflict with this Standard.

The proposed construction of the International Cruise Terminal does not entail removal or alteration of any historic materials, features or spaces.

Standard 3. *Each property shall be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or architectural elements from other buildings, shall not be undertaken.*

The proposed design of the International Cruise Terminal does not include any elements that would create a false sense of historical development. As discussed below with reference to Standard 9, the proposed design incorporates several elements that clearly reference aspects of San Francisco's historic pier buildings without mimicking those buildings.

Standard 4. *Most properties change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.*

Pier 27 is a non-contributing feature of the Embarcadero Historic District, as it was built outside the district's period of significance. Nor does Pier 27 appear to be eligible for listing on the National Register of Historic Places as an individual resource. The pier is less than 50 years old and does not possess sufficient architectural or historical significance to be a contributor to the historic district or an individually eligible resource. As a result, Pier 27 does not constitute a change to the site that has acquired significance in its own right, and its proposed demolition is not in conflict with this Standard.

Furthermore, removal of the current Pier 27 would constitute a significant improvement to the character of the Embarcadero Historic District. The design of the existing concrete shed and bulkhead are not compatible with the Embarcadero Historic District, and the shed materially obscures the outshore end of historic Pier 29. In addition, northerly sightlines from the portion of the Embarcadero between Piers 27 and 29 to the bay, which are currently blocked by Pier 27, would be restored following construction of the International Cruise Terminal.

Standard 5. *Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a property shall be preserved.*

The proposed removal of the existing Pier 27 building will require the rationalization (including removal of some historic materials) of the fragmented end of historic Pier 29. A design treatment for Pier 29 following the removal of Pier 27 has been proposed. ARG evaluated this proposal (in a separate memo dated April 13, 2011) and found it consistent with the *Secretary's Standards*.

The proposed removal of the existing Pier 27 building and construction of the International Cruise Terminal does not entail removal of any other distinctive features, finishes, construction techniques or examples of craftsmanship.

Standard 6. *Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.*

The proposed removal of the existing Pier 27 building and construction of the International Cruise Terminal does not entail replacement of any historic materials.

Standard 7. *Chemical or physical treatments, such as sandblasting, that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible.*

The proposed removal of the existing Pier 27 building and construction of the International Cruise Terminal does not entail any cleaning or other treatment of historic materials.

Standard 8. *Significant archeological resources affected by a project shall be protected and preserved. If such resources must be disturbed, mitigation measures shall be undertaken.*

Though an archeological evaluation is beyond the scope of this analysis, given the site's bayside location, it is not anticipated that the proposed project would affect any significant archeological resources.

Standard 9. *New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.*

The proposed design of the International Cruise Terminal incorporates a number of elements that, together, ensure that the building will be both compatible with and differentiated from the surrounding Embarcadero Historic District, including the adjacent Pier 29.

Several aspects of the proposed design of the International Cruise Terminal draw on the architectural vocabulary of the Historic District's contributing piers:

- The footprint, height, and horizontally-oriented massing of the proposed terminal are similar to those of the historic pier structures.

- The tallest portions of the proposed terminal are limited to a central spine, in keeping with the arrangement of monitor windows along the historic pier sheds.

- Projecting metal canopies are a common feature in the Historic District. The proposed terminal is capped with an overhanging canopy roof that, in profile and scale, evokes these historic canopies.

- The design of the cargo area along the east side of the building references the scale and rhythm of solid to void created by the historic placement of the roll-up doors and pedestrian entrances along the historic pier sheds.

- The design of the proposed terminal visually separates the solid first floor cargo area from the glazing-dominated passenger area above. This approach references the distinction in the design of the historic pier sheds between the main body of the shed, which entailed using mostly solid walls to securely store goods, and the roof monitors above, which provided illumination.

- The horizontal metal panels or concrete siding proposed for the first floor cargo and baggage handling areas is similar in location and scale to the horizontal cladding, including wood siding and board formed concrete, found on the historic pier sheds.

At the same time, the proposed terminal does not mimic the historic pier sheds and will be clearly identifiable as a modern intervention:

- The extensive use of metal/concrete panel cladding and glass walls will clearly identify the building as a contemporary structure.

- The discontinuous massing of the building will differentiate it from the repetitive, strictly linear massing of the historic pier sheds.

- The building's canopy roof, which will be broken into two separate portions of slightly varied slope, references both the flat roof and shallow-pitched gable roofs of historic pier sheds within the Historic District without duplicating either.

- While the proposed canopy roof references the projecting metal canopies of the historic pier sheds, the proposed use of narrow columns to support the canopy on the terminal's west side will distinguish the new canopy from the historic canopies.

- The proposed terminal's outshore end, which will consist of an uncovered service area enclosed by an open aluminum fence up to ten feet in height, will be easily distinguishable from the historic sheds, most of which terminate in a low-pitched gabled end wall. This visual distinction would remain if this portion of the terminal is built out in the future as an extension of the cargo-oriented first floor.

- Though not required in order to be in conformance with the *Secretary's Standards*, the base of the terminal may be visually strengthened through incorporation of fritted glass or metal screens at the first story of the lobby portion of the building. Based on initial renderings, the proposed fritted glass design consisting of horizontal striations appears to best accomplish that objective.

Standard 10. *New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.*

The proposed International Cruise Terminal is not physically connected to any contributing buildings or character-defining features of the Port of San Francisco Embarcadero Historic District. As a result, removal of the building in the future will not alter any historic resource or adversely affect the integrity of the historic waterfront.

Appendix: Photos and Drawings of Proposed International Cruise Terminal

Aerial view of Pier 27/Pier 29 area, looking east. (Source: KMD Architects/Pfau Long Architecture)

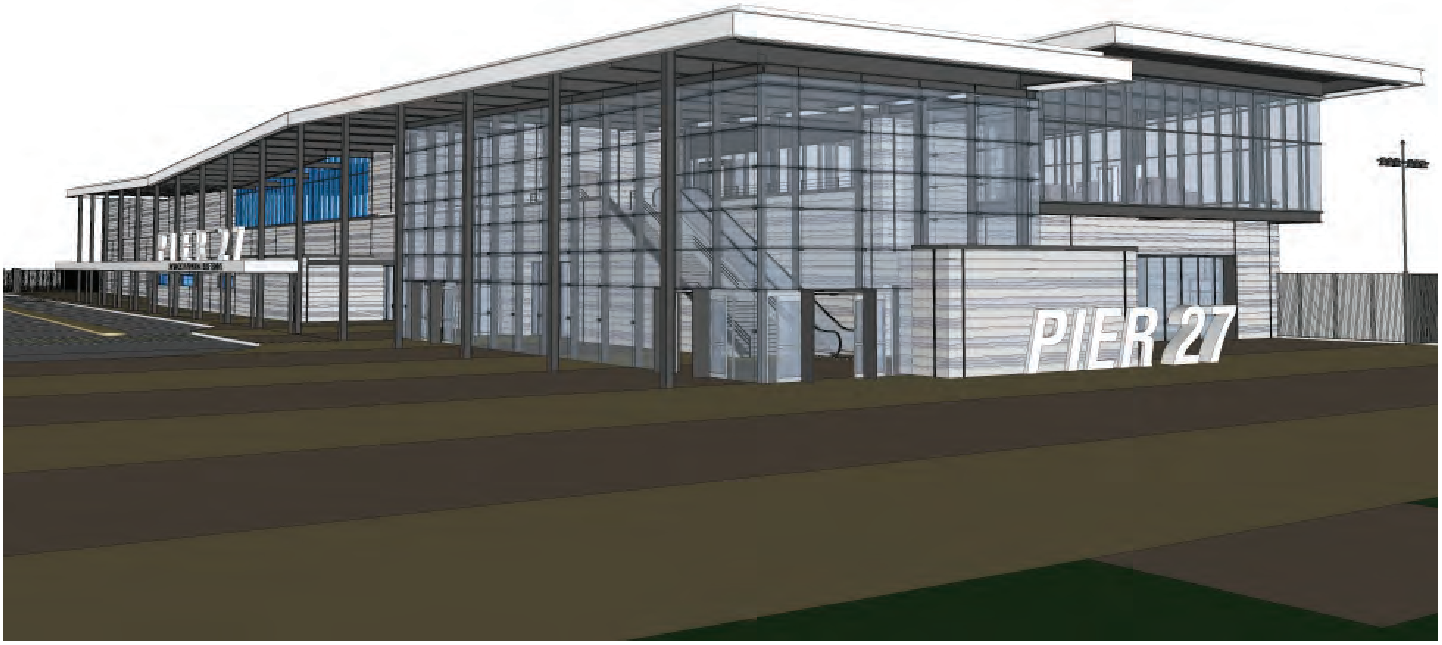
Aerial view of Pier 27/Pier 29 area, looking east, with "bulkhead zone" in orange. (Source: KMD Architects/Pfau Long Architecture)

Appendix: Photos and Drawings of Proposed International Cruise Terminal

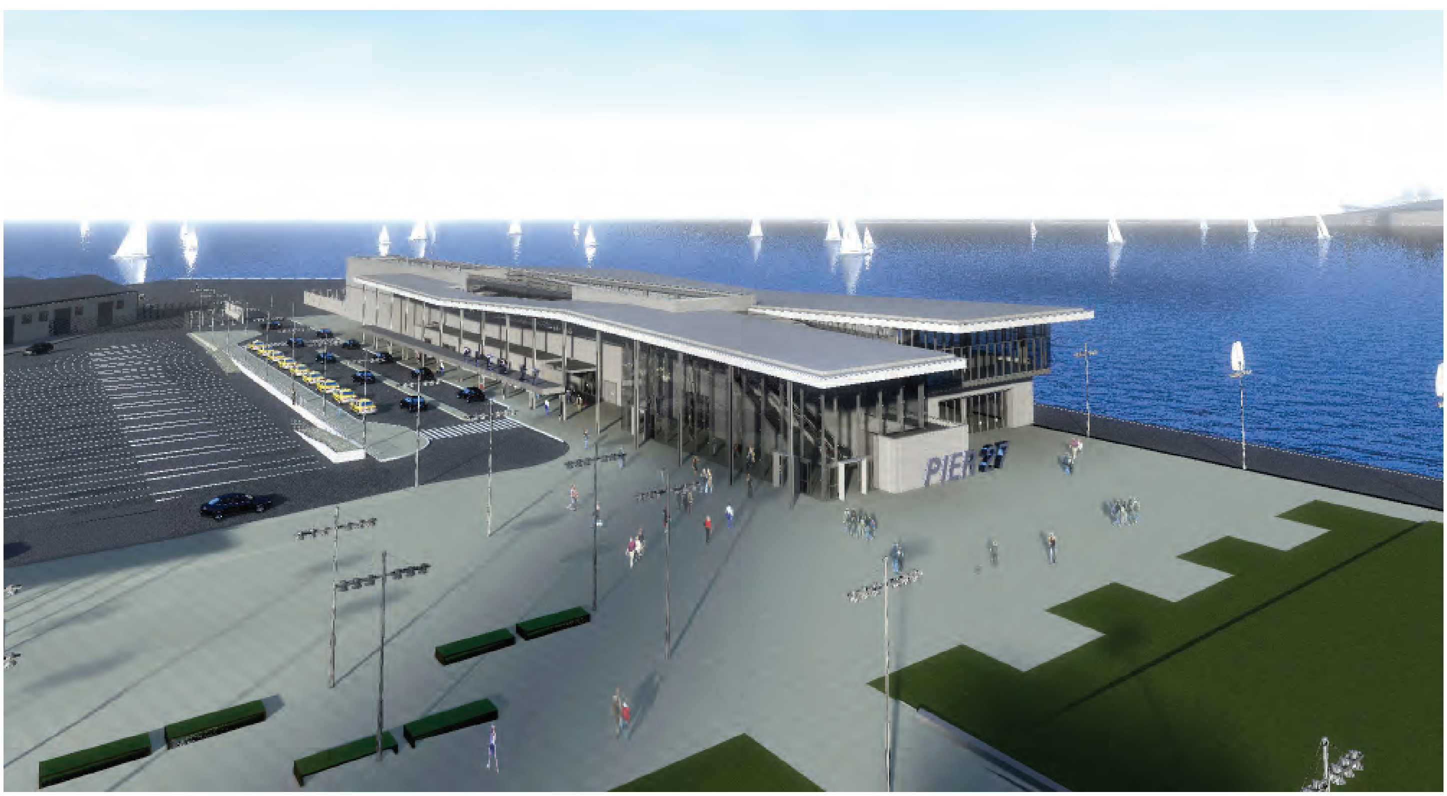
Aerial view of Pier 27/Pier 29 area, looking east. (Source: KMD Architects/Pfau Long Architecture)

Aerial view of proposed cruise terminal, looking east. (Source: KMD Architects/Pfau Long Architecture)

Appendix: Photos and Drawings of Proposed International Cruise Terminal

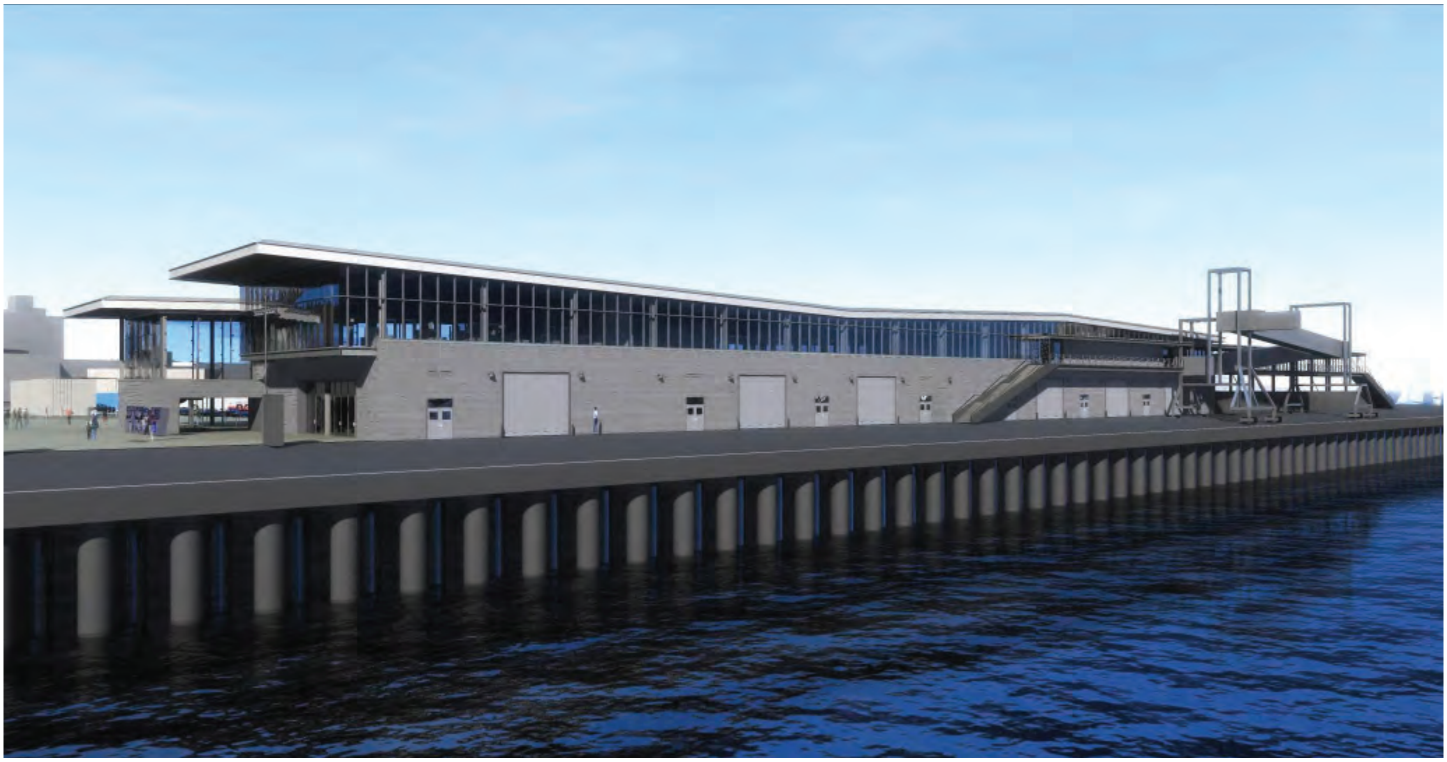


View of proposed terminal, looking northeast. (Source: KMD Architects/Pfau Long Architecture)



Bird’s eye view of proposed terminal, looking northeast. (Source: KMD Architects/Pfau Long Architecture)

Appendix: Photos and Drawings of Proposed International Cruise Terminal



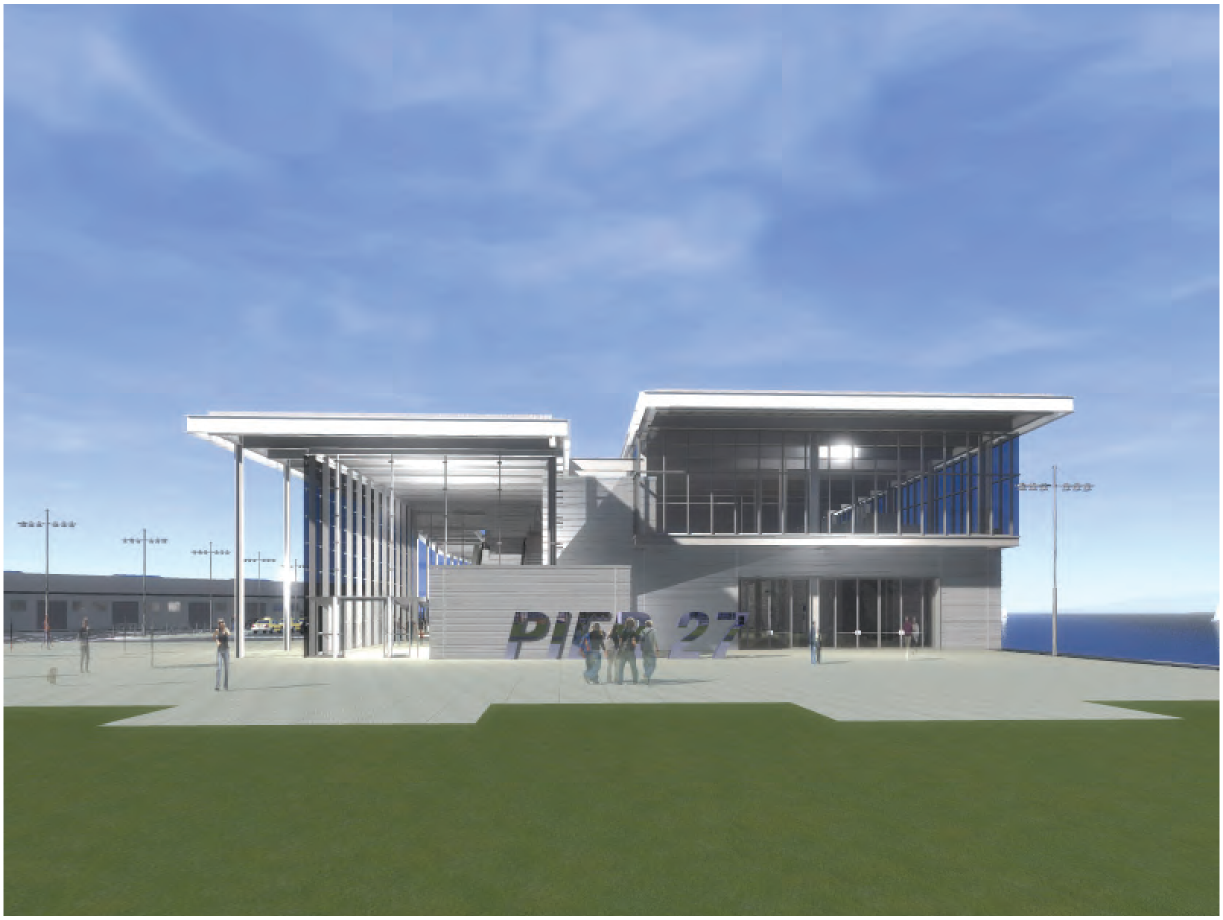
View of proposed terminal, looking northwest. (Source: KMD Architects/Pfau Long Architecture)

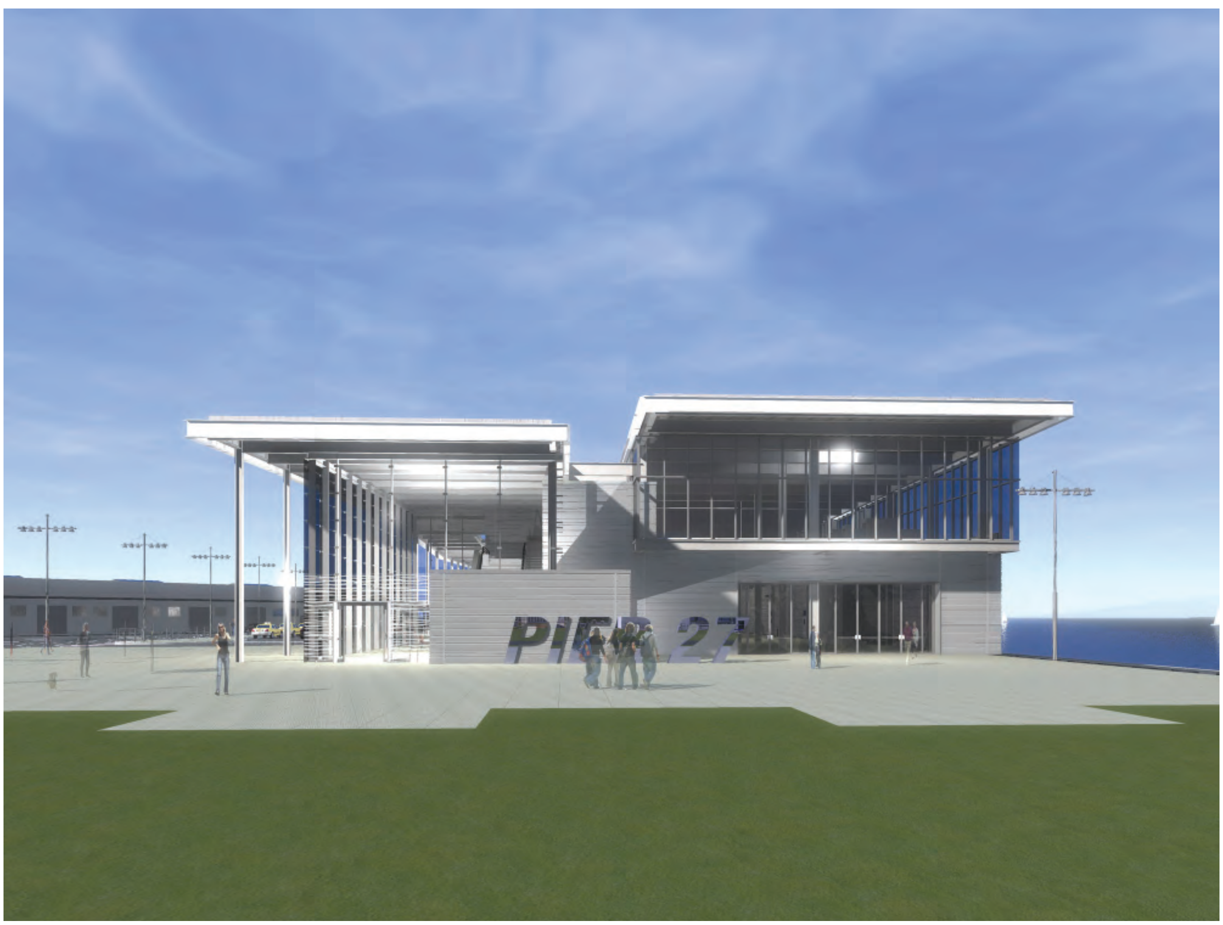
Section comparing existing Pier 27 and proposed terminal. (Source: KMD Architects/Pfau Long Architecture)

Appendix: Photos and Drawings of Proposed International Cruise Terminal

View of proposed terminal looking northeast, without (top) and with (bottom) fritted glass.
(Source: KMD Architects/Pfau Long Architecture)

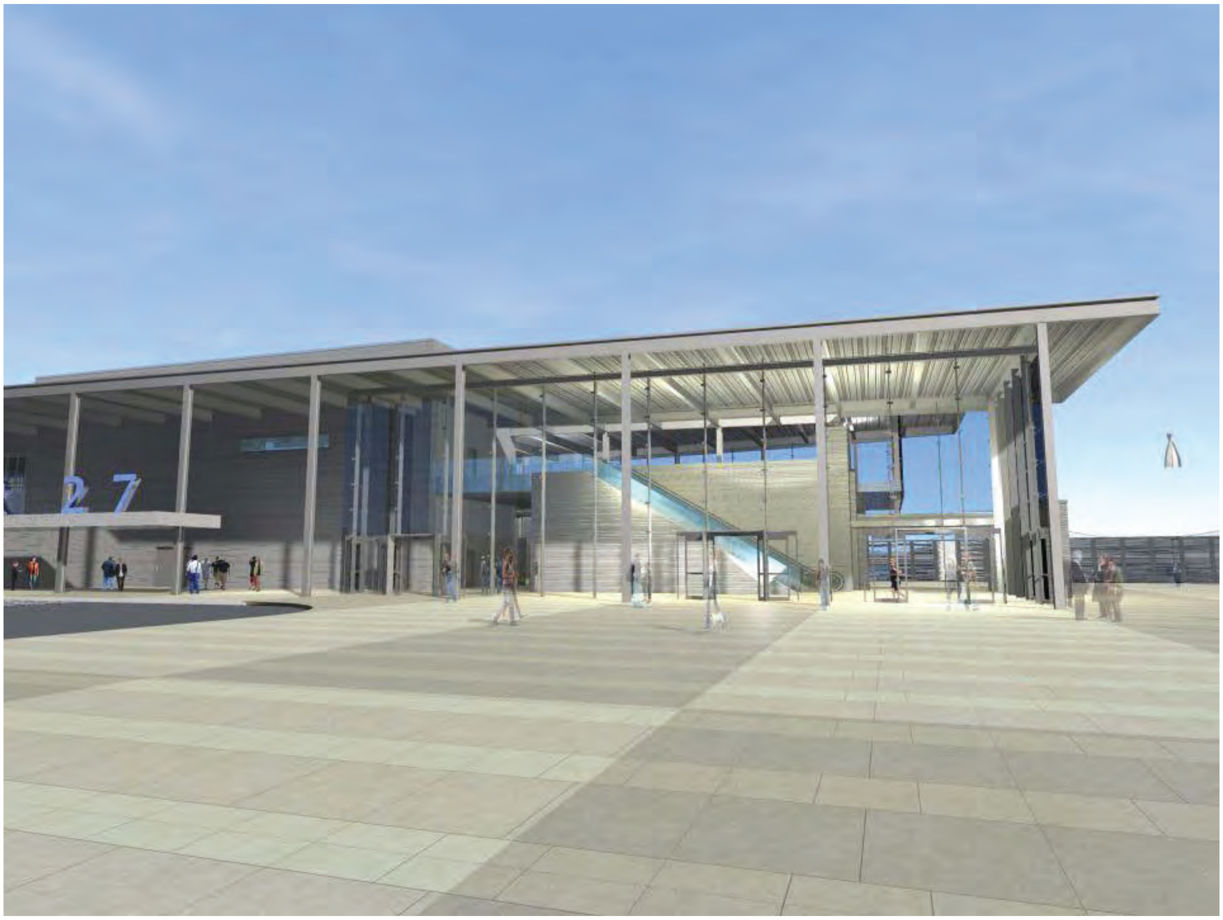
Appendix: Photos and Drawings of Proposed International Cruise Terminal

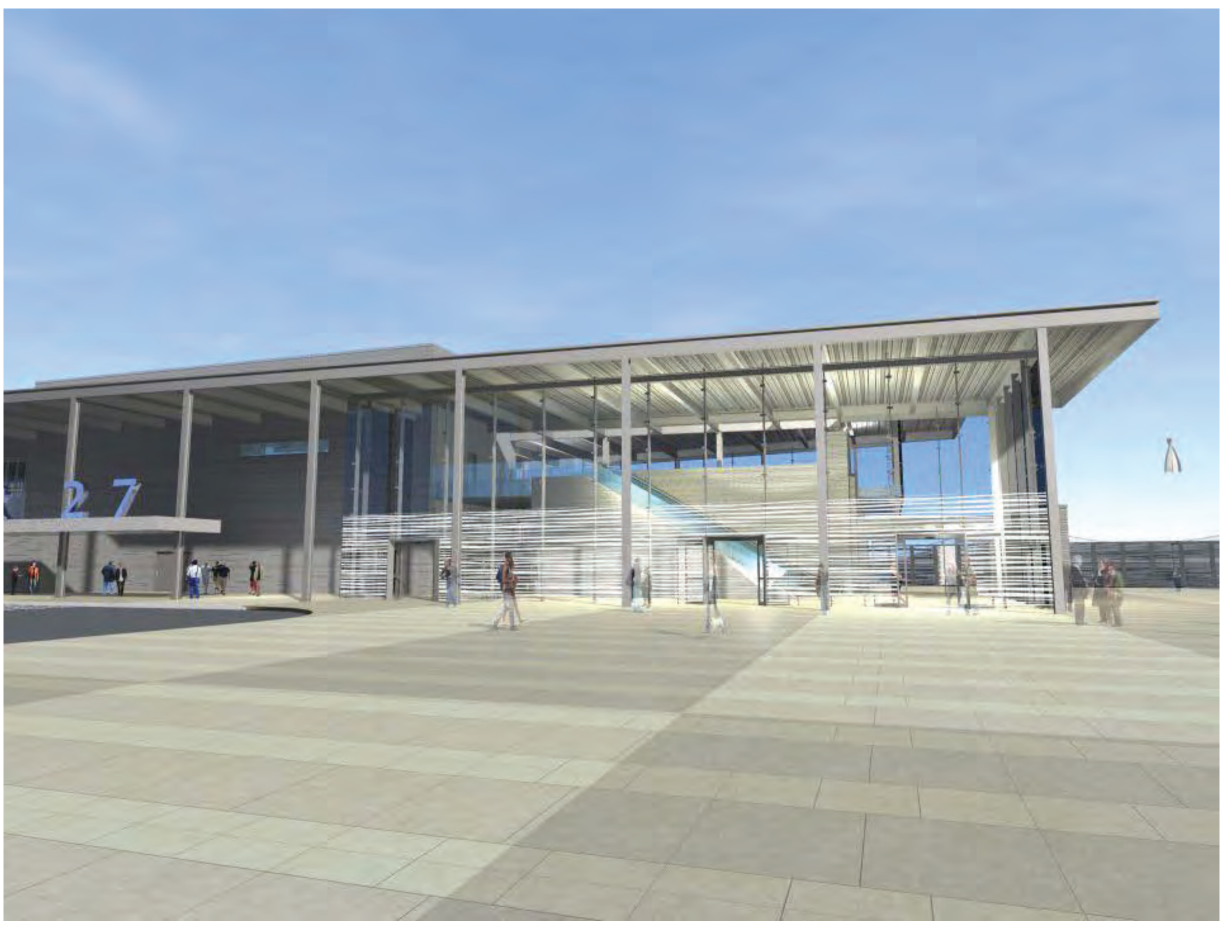




View of proposed terminal looking north, without (top) and with (bottom) fritted glass.
(Source: KMD Architects/Pfau Long Architecture)

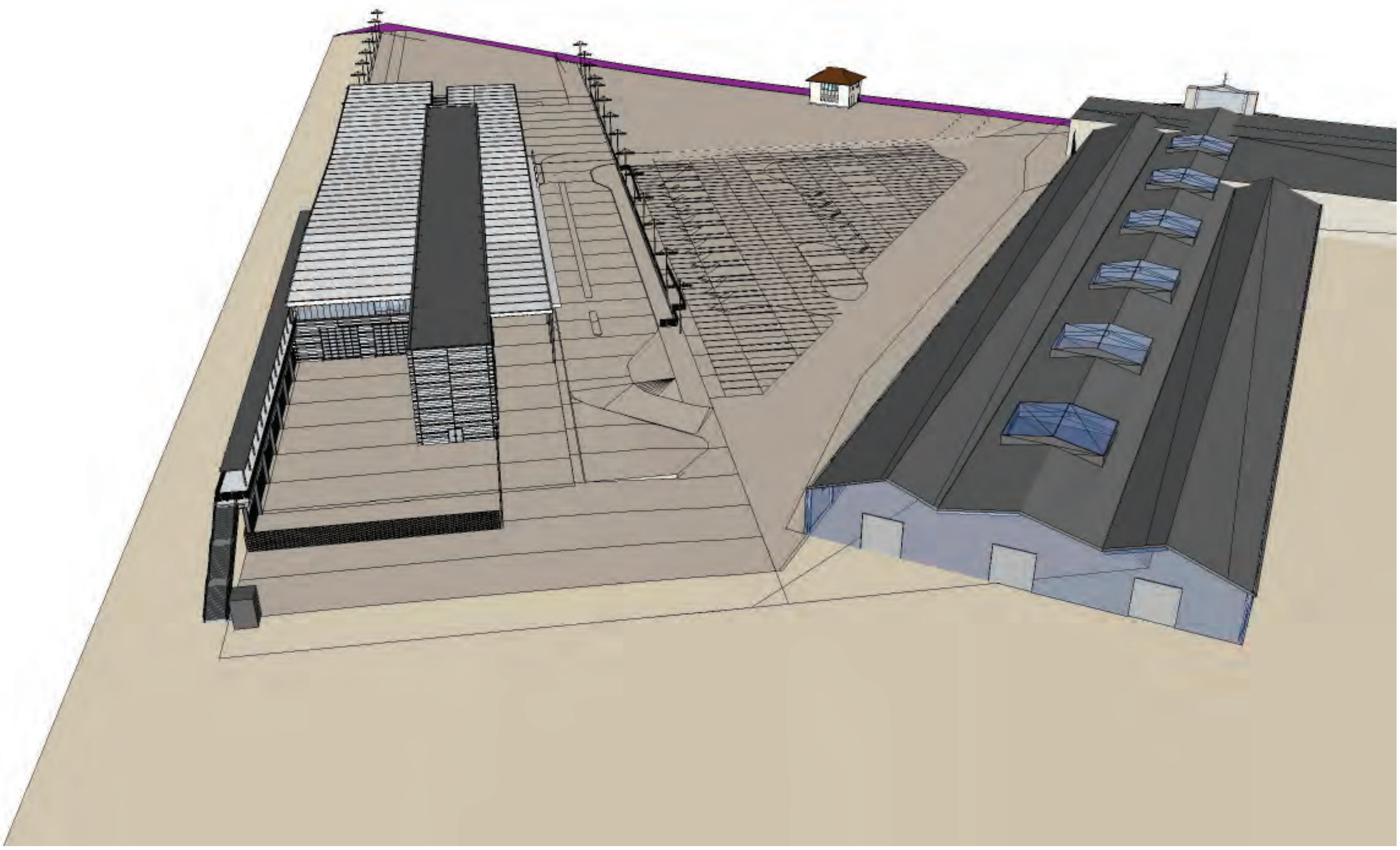
Appendix: Photos and Drawings of Proposed International Cruise Terminal





View of proposed terminal looking east, without (top) and with (bottom) fritted glass.
(Source: KMD Architects/Pfau Long Architecture)

Appendix: Photos and Drawings of Proposed International Cruise Terminal



Drawing of proposed terminal and Pier 29, looking south. (Source: KMD Architects/Pfau Long Architecture)

APPENDIX CP-3

Design Guidelines for Northeast Wharf Plaza, Pier 27 Project Consistency with Secretary's Standards Memorandum (prepared by Architectural Resources Group, Inc. on June 6, 2011)

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ARCHITECTURAL RESOURCES GROUP, INC.
Architects, Planners & Conservators

MEMORANDUM

To: Mark Paez
Preservation Planner
Port of San Francisco
Pier 1, The Embarcadero
San Francisco, CA 94111

Project: International Cruise Terminal & Northeast Wharf Plaza, Pier 27
San Francisco, CA

Project #: 11065

Date: June 6, 2011

Phone: 415-705-8674

Via: e-mail

Re: Design Guidelines for Northeast Wharf Plaza, Pier 27
Project Consistency with *Secretary's Standards*

1. Introduction

In response to your request, Architectural Resources Group (ARG) has completed this assessment of the design guidelines for the development of the Northeast Wharf Plaza at Pier 27 in connection with the construction of the International Cruise Terminal and Northeast Wharf Plaza for consistency with the *Secretary of the Interior's Standards for Rehabilitation*. The proposed project includes removal of the Pier 27 Annex, removal of the temporary tent structures and prefabricated buildings that house Teatro Zinzanni, and retention of the Pier 29 Annex (Belt Line Railroad Building). The project will construct a 2.5-acre open space with three freestanding park structures and one restaurant.

ARG at the request of the Port of San Francisco developed the "Historic Resources Report Piers 27, 29 and 31" in September 1999. The report included an historical overview, building description, conditions analysis, character-defining features and additions or alterations for each of the structures. From 2003-2005 further research on properties along San Francisco's waterfront resulted in the nomination and designation of the Port of San Francisco Embarcadero National Register Historic District (Historic District) in May 2006. The nomination includes information on the resources and the Historic District that are the subject of this memorandum.

At the request of the Port of San Francisco in March 2011 ARG reviewed and updated the 1999 Historic Resources Report. That revised report describes the resources within the project area and is the basis for the historic narrative supporting this report. The historical status of the structures that are the subject of the memorandum is as follows:

Pier 9, The Embarcadero . San Francisco, California 94111
415.421.1680 . 415.421.0127 *fax*
www.argsf.com

- The Port of San Francisco Embarcadero National Register Historic District includes an approximately three-mile curving stretch of San Francisco's northeastern waterfront from Pier 45 at Fisherman's Wharf, south to Pier 48 at China Basin. The district includes pier structures, other waterfront structures such as the Ferry Building, as well as the waterside portion of the Embarcadero corridor including the Seawall, Herb Caen Way/Embarcadero Promenade and the Bulkhead Wharf. Most of the district resources were constructed between 1908 and 1938, though the construction of the seawall and Ferry Building dates from the 1890s.

- Pier 27 is a non-contributor to the Port of San Francisco Embarcadero Historic District because it was built in the mid-1960s, outside the district's period of significance.

- The Pier 27 Annex (also known as the Pier 29 Office Building) is a non-contributing resource to the district. Built in 1962 the building is less than fifty years of age and is outside the period of significance identified for the historic district.

- The Pier 29 Annex (Belt Line Railroad Building) is a contributor to the Port of San Francisco Embarcadero National Register Historic District.

- Pier 29 is a contributor to the Port of San Francisco Embarcadero National Register Historic District.

- Teatro Zinzanni consists of a series of temporary tent structures and portable support buildings. Installed on the site in March 2000 (well outside the district's period of significance) the structures are not contributors to the district. Because of their temporary nature, the tent structures and ancillary portable buildings were not evaluated nor included as non-contributing structures in the Port of San Francisco Embarcadero National Register Historic District nomination.

In conjunction with this assessment of the proposed design of the Northeast Wharf Plaza, ARG has completed a separate memorandum evaluating the proposed design of the International Cruise Terminal for consistency with the *Secretary's Standards*.

2. The Secretary of the Interior's Standards for Rehabilitation

The Secretary of the Interior is responsible for establishing standards for all programs under Departmental authority and for advising Federal agencies on the preservation of historic properties listed in or eligible for listing in the National Register of Historic Places. The *Standards for Rehabilitation* (codified in 36 CFR 67 for use in the Federal Historic Preservation Tax Incentives program) address the most prevalent treatment. "Rehabilitation" is defined as "the process of returning a property to a state of utility, through repair or alteration, which makes possible an efficient contemporary use while preserving those portions and features of the property which are significant to its historic, architectural, and cultural values."

Initially developed by the Secretary of the Interior to determine the appropriateness of proposed project work on registered properties within the Historic Preservation Fund grant-in-aid program, the *Standards for Rehabilitation* (the *Standards*) have been widely used over the years—particularly to determine if a rehabilitation qualifies as a Certified Rehabilitation for Federal tax purposes. In addition, the *Standards* have guided Federal agencies in carrying out their historic preservation responsibilities for properties in Federal ownership or control; and State and local officials in reviewing both Federal and nonfederal rehabilitation proposals. They have also been adopted by historic district and planning commissions across the country.

The intent of the *Standards* is to assist the long-term preservation of a property's significance through the preservation of historic materials and features. The *Standards* pertain to historic buildings of all materials, construction types, sizes, and occupancy and encompass the exterior and interior of the buildings. They also encompass related landscape features and the building's site and environment, as well as attached, adjacent, or related new construction. To be certified for Federal tax purposes, a rehabilitation project must be determined by the Secretary of the Interior to be consistent with the historic character of the structure(s), and where applicable, the district in which it is located. The Standards are to be applied to specific rehabilitation projects in a reasonable manner, taking into consideration economic and technical feasibility.

The ten Rehabilitation Standards and an evaluation of the project's consistency with each standard follow in Section 5 of this memorandum.

3. Construction Background

Several structures exist today within the boundaries of the proposed Northeast Wharf Plaza at Pier 27 or in its immediate environment, such as Pier 29, which defines the plaza's western edge. The substructure, transit shed and bulkhead building at Pier 29 were completed in 1916, 1917 and 1918, respectively. The current pier and shed at Pier 27 were constructed 1965-1967 replacing two wooden piers: Piers 25 & 27. Pier 25, which dated from the early 1900s, along with its Neoclassical style bulkhead building, constructed in 1920, were demolished in 1965 in preparation for the construction of the current Pier 27 pier and shed. The former Pier 27 was removed in 1948.

The Pier 27 Annex (also known as the Pier 29 Office Building) appears to have been constructed in 1962. Conflicting Port records indicate the building was associated with both Pier 27 and Pier 29. Built as offices, it remains in office use. There remains some uncertainty whether any portion of the former Pier 27 Bulkhead is a part of this structure.

The Pier 29 Annex (Belt Line Railroad Building) was originally constructed in 1909 near what is now Pier 3. Constructed as one of a pair of buildings, this Mission Style office building with Craftsman and Prairie style features was moved to its current site in 1918. It was put into service in January 1919 and served as offices and employee facilities in support of the Belt Line Railroad Engine House located directly across from the site, on the south side of the Embarcadero at Seawall Lot 319. The property was transferred to Kyle Railroads and then to the Port of San Francisco. Since 1973 the Port of San Francisco has leased the building to various tenants.

Installed in March 2000, Teatro Zinzanni is a series of two tents that are circular in plan and are located immediately adjacent to the Embarcadero. The tents are accompanied by four prefabricated temporary buildings located immediately north of the tent structures.

4. Project Description
The development of Northeast Wharf Plaza is a future project for which design documents have not been fully realized. The Port of San Francisco has developed a set of design guidelines for the development for a 2.5-acre park to include three new park structures and one new restaurant building. These guidelines include a section that is intended to allow the creation and build-out of the new park in a manner that recognizes the Historic District setting of the project and seeks to be compatible with it.

The guidelines are as follows:

1. **Plaza Relationship to Historic District.** Plaza structures and public spaces should respect the character-defining features and be compatible with the Historic District by recognizing the bulkhead, pier, and apron zones, with improvements within those zones being compatible with the architectural character of the Historic District.

2. **Structures at Northeast Wharf Plaza.** Structures near the Northeast Wharf Plaza should be designed to be compatible with the historic character of bulkhead buildings through the following:

   a) To feature the Belt Line Railroad Building and recognize its unique waterfront placement as a freestanding structure located on the bulkhead wharf fronting on the Embarcadero Promenade, new structures should be held back from the Embarcadero Promenade at least 30 feet and provide visual separation from the Belt Line Railroad Building accomplished by separating the new structures from the Belt Line Building by at least 40 feet;

   b) To acknowledge and strengthen the Cruise Terminal as the dominant maritime use of the pier, new structures should be located to respect the sight line from the Embarcadero Promenade to the terminal, and sited to follow the geometry established by the cruise terminal structure (instead of being parallel to the Embarcadero Promenade);

   c) To acknowledge the monumental scale and civic character of the historic bulkhead buildings, new structures should have substantial height, massing and forms which may be accomplished with tall ground floor heights, walls with large sections of solid and void, strong cornice features, and prominent entries. This may be accomplished with a symmetrical façade to the front of the new structures that features a wide central storefront with doors and windows to the base, and flanked with solid sections that have fewer or smaller amounts of glazing; and

   d) To architecturally complement the Belt Railroad and bulkhead buildings new structures should be finished in industrial materials characteristic of the Historic District such as concrete, stucco or metal siding and steel sash windows.

3. **Plantings at Northeast Wharf Plaza.** To recognize the Belt Line Railroad Building's historic placement as a freestanding structure within a working maritime environment and the industrial character of the Historic District, significant plantings should be setback at least 20 feet from the Belt Line Building. Lawn areas in the Plaza should be in raised planters that appear as an additive feature over the pier deck. Other plantings in the Plaza should serve to delineate space and

should be limited to trees or plants in clearly defined planters or within the pier deck in a manner that continues to allow the site to be expressed as a pier deck.

4. **Gateway Building** (south edge of Plaza). The proposed new gateway restaurant building is located adjacent to the Embarcadero Promenade within the zone of the bulkhead buildings and should be designed to be compatible with the historic character of the bulkhead buildings through the following:

   a) To extend the visual line of the Embarcadero bulkhead buildings, the new building should be located at or close to the Embarcadero Promenade;

   b) To recognize the maritime function of the pier, the new building should be located at or close to the edge of the pier apron;

   c) To acknowledge the monumental scale and civic character of the historic bulkhead buildings, the new structure should have substantial height, massing and forms, which may be accomplished with tall ground floor heights, strong cornice features, and walls with large sections of solid and void. This may be accomplished with a wide storefront with doors and windows to the base, and flanked with solid sections that have fewer or smaller amounts of glazing;

   d) To architecturally complement the bulkhead buildings, the new structure should be finished in industrial materials characteristic of the Historic District such as concrete, stucco or metal siding and steel sash windows.

5. Project Assessment
The proposed treatment of the Northeast Wharf Plaza as defined by design guidelines developed by the Port of San Francisco is discussed for consistency with each of the *Secretary of the Interior's Standards for Rehabilitation*.

Standard 1. *A property shall be used for its historic purpose or be placed in a new use that requires minimal change to the defining characteristics of the building and its site and environment.*

The proposed development of the Pier 27 site consists of two major elements, the Northeast Wharf Plaza and the San Francisco Cruise Terminal. Each appears to retain the character of the waterfront historic district. The Cruise Terminal will continue the existing use of handling cargo and provisioning for the cruise industry. The Northeast Wharf Plaza, designed as an open park space, provides for public access to the Cruise Terminal and expands views and vistas to the open water. The design guidelines identify means to retain the physical character of the pier deck with low-scale landscape features clearly delineated as an added layer and distinguished from the pier structure.

The Belt Line Railroad Building would remain a contributor to the Embarcadero Historic District. Its use will likely remain an office function or support building for the proposed plaza. Proposed site improvements remove non-contributing resources which have altered the historic setting. The proposed open space will reinforce the Belt Line Railroad Building's status as a freestanding structure. As indicated in Guideline 3 any proposed landscaping should be set back from the building to recognize the building's placement within a working maritime environment.

The proposed maritime use of this site is consistent with the Port's Public Trust mandate as set forth in the San Francisco Bay Conservation and Development Commission (BCDC) San Francisco Waterfront Special Area Plan and the Port's Waterfront Land Use Plan. The continued maritime use of the Historic District is also important because it is a form of the historic use and function as an ocean and inland cargo transportation port.

Standard 2. *The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.*

The plaza design proposes to remove a rear addition to the Belt Line Railroad Building, a contributing building to the Port of San Francisco National Register Historic District. The addition dates from 1918-1919, just after the relocation of the building to its current site. Constructed of concrete block and finished to match the principal building, the exterior and interiors have undergone a series of undocumented modifications since its construction including window replacement and blocking of windows. The interior alterations include sealing off access from the original interior stair at the north wall, and subdivision of the second floor offices.

The scope of this report did not include assessment of the addition's integrity and ability to contribute to the historic resource. Removal of the addition may be considered a significant impact should the addition be found to retain sufficient integrity to contribute to the historic character of the Belt Line Railroad Building. Further study is needed to assess the integrity of the addition and whether it retains sufficient integrity to be considered an integral part of the Belt Line Railroad Building, which is a contributing resource. Should the addition be an integral part of the contributing resource, the Port should determine a retention strategy to reduce the project's impact to a less than significant level.

Standard 3. *Each property shall be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or architectural elements from other buildings, shall not be undertaken.*

The park development design guidelines seek to ensure that new construction is compatible with the historic character of Pier 27, Pier 29, the Pier 29 Annex (Belt Line Railroad Building), and the surrounding Historic District. The guidelines do not, however, specify that new construction must also be clearly distinguished from adjacent historic structures. The design guidelines should be expanded to explicitly discourage "copying" the look and feel of Pier 29 or the Belt Line Railroad Building or otherwise engendering a false sense of historical development.

Standard 4. *Most properties change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.*

The Pier 29 Annex (Belt Line Railroad Building), a contributing resource to the historic district, will be retained as a part of the proposed Northeast Wharf Plaza development. The rear addition is proposed for demolition (See discussion under Standard 2).

The following are proposed for demolition to accomplish the Northeast Wharf Plaza design:

The Pier 29 Annex (Belt Line Railroad Building) Rear Addition: Removal of the rear addition may be considered a significant impact should the addition be found to retain sufficient integrity to contribute to the historic character of the Belt Line Railroad Building. As stated in the discussion under Standard 3, further study is needed to assess the integrity of the addition and whether the addition constitutes "a change that has acquired significance in its own right" and is a contributing element of the historic district. Should the addition be contributing, the Port should determine a retention strategy to reduce the project's impact on this resource to a less than significant level.

Pier 27: Pier 27 is a non-contributing feature of the Embarcadero Historic District, as it was built outside the district's period of significance. Nor does Pier 27 appear to be eligible for listing on the National Register of Historic Places as an individual resource. The pier is less than 50 years old and does not possess sufficient architectural or historical significance to be a contributor to the historic district or an individually eligible resource. As a result, Pier 27 does not constitute a change to the site that has acquired significance in its own right. Therefore removal of this non-contributor is consistent with the Secretary's Standards.

Pier 27 Annex (Also known as the Pier 29 Office Building): The Pier 27 Annex is less than 50 year of age and does not possess sufficient architectural or historical significance to be a contributor to the historic district or an individually eligible resource.

Teatro Zinzanni: The group of tents and temporary structures on-site that are affiliated with Teatro Zinzanni are less than 50 years of age and do not possess sufficient architectural or historical significance to be contributors to the historic district or individually eligible resources.

Standard 5. *Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a property shall be preserved.*

The design guidelines do not propose or encourage the removal of any distinctive features, finishes or character defining construction techniques. The guidelines should explicitly incorporate the Port's current policy, which stipulates that any rehabilitation of contributing resources to the Historic District shall be conducted in compliance with the *Secretary of the Interior's Standards for Rehabilitation*.

Standard 6. *Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.*

The design guidelines do not address the treatment of deteriorated historic features. The guidelines should explicitly incorporate the Port's current policy, which stipulates that any rehabilitation of contributing resources to the Historic District shall be conducted in compliance with the *Secretary of the Interior's Standards for Rehabilitation*.

Standard 7. *Chemical or physical treatments, such as sandblasting, that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible.*

The proposed design guidelines specify no chemical or physical treatments of existing historic materials. The guidelines should explicitly incorporate the Port's current policy, which stipulates that any rehabilitation of contributing resources to the Historic District shall be conducted in compliance with the *Secretary of the Interior's Standards for Rehabilitation*.

Standard 8. *Significant archeological resources affected by a project shall be protected and preserved. If such resources must be disturbed, mitigation measures shall be undertaken.*

Though an archeological evaluation is beyond the scope of this analysis, given the site's bayside location, it is not anticipated that the proposed project would affect any significant archeological resources.

Though an archeological evaluation is beyond the scope of this analysis, given that the proposed Northeast Wharf Plaza would reuse the existing pier and bulkhead wharf deck and substructure, it is not anticipated that the project would affect any significant archeological resources.

Standard 9. *New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.*

See discussion under Standard 3. Guidelines 1, 2 and 5 each address the necessary compatibility of proposed improvements with the architectural character of the historic district. The guidelines should go further to specify that proposed improvements within the Port of San Francisco Embarcadero National Register Historic District shall be differentiated from adjacent historic buildings and, more generally, will meet the *Secretary's Standards*.

Changes affecting the Pier 29 Annex (Belt Line Railroad Building) should specifically identify that the work shall be compatible with the building's mass, scale, and architectural features in order to protect the historic property and its environment. Should the removal of the rear addition be found to cause no impact, guidelines on the repair/replacement of the rear façade of the Pier 29 Annex should be discussed.

To maintain the visual continuity of the waterfront along the Embarcadero, we recommend that buildings proposed within the bulkhead zone have gable roof forms and/or parapets that are compatible with the roof forms of the Pier 29 Annex and the historic bulkhead buildings.

Standard 10. *New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.*

The proposed new construction is not physically connected to contributing buildings or character-defining features of the historic district. As a result, if removed in the future, new features will not alter the historic resource or destroy the integrity of its environment.

Aerial view of project site, looking east. (Source: KMD Architects/Pfau Long Architecture)


View of proposed Northeast Wharf Plaza, looking northeast. (Source: KMD Architects/Pfau Long Architecture)

APPENDIX CP-4
State of California, Department of Parks and Recreation Forms for Piers 80, 60, and 64

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State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary #
HRI #
Trinomial
NRHP Status Code

Other Listings
Review Code **Reviewer** **Date**

Page 1 **of** 3 *__Resource Name or #:__ Pier 80 Cargo Terminal

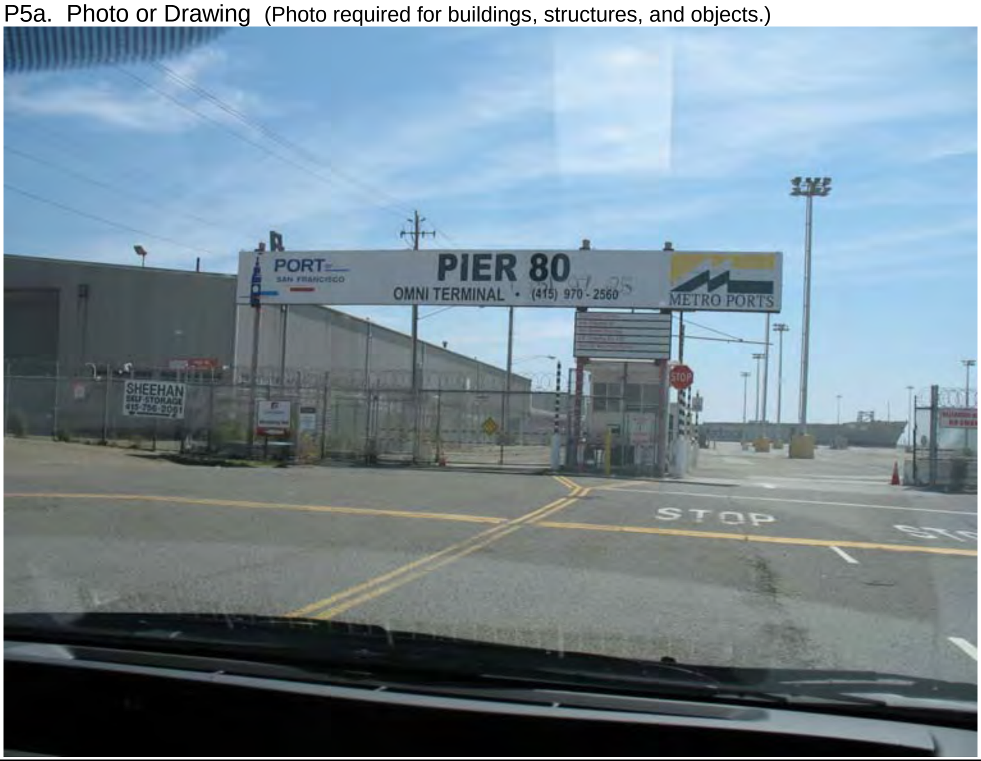
P1. Other Identifier:
***P2. Location:** ☐ **Not for Publication** ■ **Unrestricted** ***a. County:** San Francisco
and (P2b and P2c or P2d. Attach a Location Map as necessary.)
***b. USGS 7.5' Quad:** San Francisco, South, CA **Date:** **T** ; **R** ; **¼ of** **¼ of Sec** **;** M.D. **B.M.**
c. Address: 601 Cesar Chavez Street City: San Francisco Zip: 94132
d. UTM: Zone: 10 ; mE/ mN (G.P.S.)
e. Other Locational Data: Assessor's Parcel Number Block 9900 Lot 080

***P3a. Description:** (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)

Pier 80 is a three-sided 68 acre break-bulk and container cargo terminal constructed in 1967 on landfill on San Francisco's southerneastern shoreline. The terminal is constructed of reinforced concrete supported by prestressed concrete pilings. The terminal features two large 225 by 1100 foot metal frame clear-span cargo transit warehouses arranged around a central core designed for cargo storage and staging . The warehouses have 50 foot wide deck aprons that accommodate rail car and truck delivery or receipt of cargo. In addition, there is also a smaller warehouse and administration/support building at the north west portion of the property. The terminal was constructed with rail access to each warehouse and apron. Thirty and forty ton container cargo cranes are located at the southeast portion of the property.

***P3b. Resource Attributes:** (List attributes and codes) HP8. Industrial Building
***P4. Resources Present:** ■Building ☐Structure ☐Object ☐Site ☐District ☐Element of District ☐Other (Isolates, etc.)

P5a. Photo or Drawing (Photo required for buildings, structures, and objects.)



***P6. Date Constructed/Age and Sources:** ■Historic ☐Prehistoric ☐Both
1967

***P7. Owner and Address:**
Port of San Francisco, Pier 1 The Embarcadero, San Francisco, CA 94111

***P8. Recorded by:** Mark Paez, Historic Preservation Manager, Port of San Francisco, Pier 1 The Embarcadero, San Francisco, CA 94111

***P9. Date Recorded:**
June 15, 2011

***P10. Survey Type:**
Reconnaissance

***P11. Report Citation:** San Francisco Planning Department, *The 34th America's Cup and James R. Herman Cruise Terminal and Northeast Wharf Plaza Draft EIR*, July 2011.

***Attachments:** ☐NONE ☐Location Map ☐Sketch Map ■Continuation Sheet ☐Building, Structure, and Object Record ☐Archaeological Record ☐District Record ☐Linear Feature Record ☐Milling Station Record ☐Rock Art Record ☐Artifact Record ☐Photograph Record ☐ Other (List):

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
Primary #
HRI#

BUILDING, STRUCTURE, AND OBJECT RECORD

***NRHP Status Code** 6Z
***Resource Name or #** (Assigned by recorder) Pier 80 Cargo Terminal

B1. Historic Name: Army Street Terminal
B2. Common Name: Pier 80
B3. Original Use: Break Bulk
B4. Present Use: Cargo Terminal
***B5. Architectural Style:** Industrial/Utilitarian
***B6. Construction History:** (Construction date, alterations, and date of alterations)

Pier 80 was constructed in 1967 and significantly altered in the 1970's when two of the original four warehouses were demolished to allow the Port to accommodate larger cargo containers and larger cranes necessary to load and unload lager cargo containers

***B7. Moved?** ■No ☐Yes ☐Unknown **Date:** **Original Location:**
***B8. Related Features:**

B9a. Architect: Unknown
b. Builder: Unknown
***B10. Significance: Theme:** Maritime History
Area: Port of San Francisco
Period of Significance: N/A **Property Type:** Maritime **Applicable Criteria:** N/A
(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.)

Pier 80, The Army Street Terminal, was constructed in 1967 for $27 million by the Port of San Francisco and financed by the issuance of a $50 million bond. After WWII the Port's share of the Pacific Coast cargo market declined and the Port shifted its focus to the southern waterfront where it developed new facilities that were spacious and uncongested with convenient rail and freeway access. The Army Street Terminal was developed by the Port to accommodate a combination of break bulk and container cargos in response to changing shipping technology and competition from the neighboring Port of Oakland which was able to capitalize on the shift to containerized cargo.

Pier 80 continues to operate as the Port's containerized cargo facility. Pier 80's integrity of materials, design and workmanship has been compromised as result of the loss of two of the original four warehouses. Although Pier 80 relates to the Port's maritime context it has yet to meet the National Register of Historic Places 50-year age eligibility requirement and does not appear to qualify for consideration as exceptionally significant. Therefore, at age 50 the Pier 80 Terminal should be reevaluated in the context of other southern waterfront maritime and industrial facilities from this period to determine if it is an eligible historic resource.

B11. Additional Resource Attributes: (List attributes and codes): HP8. Industrial Building

***B12. References:**

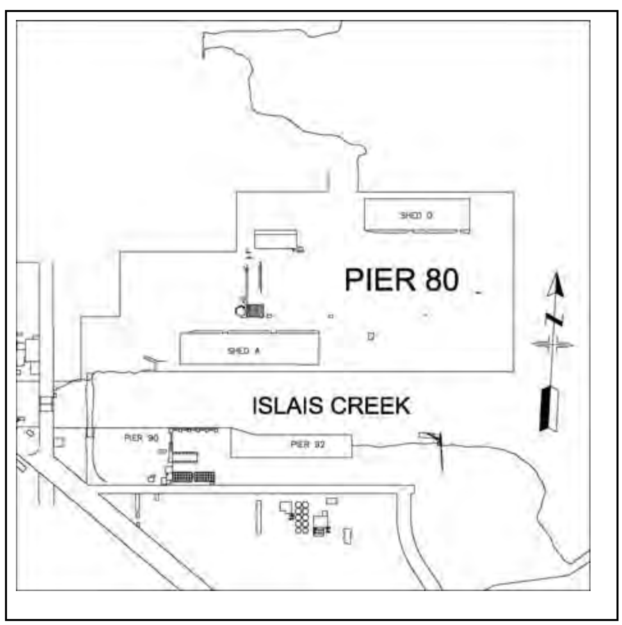
Port of San Francisco Ocean Shipping News Handbook, 1967. Port City, The History and Transformation of the Port of San Francisco, 1848-2010, Michael R. Corbett, 2010.

B13. Remarks:

***B14. Evaluator:** Mark Paez, Historic Preservation Manager, Port of San Francisco

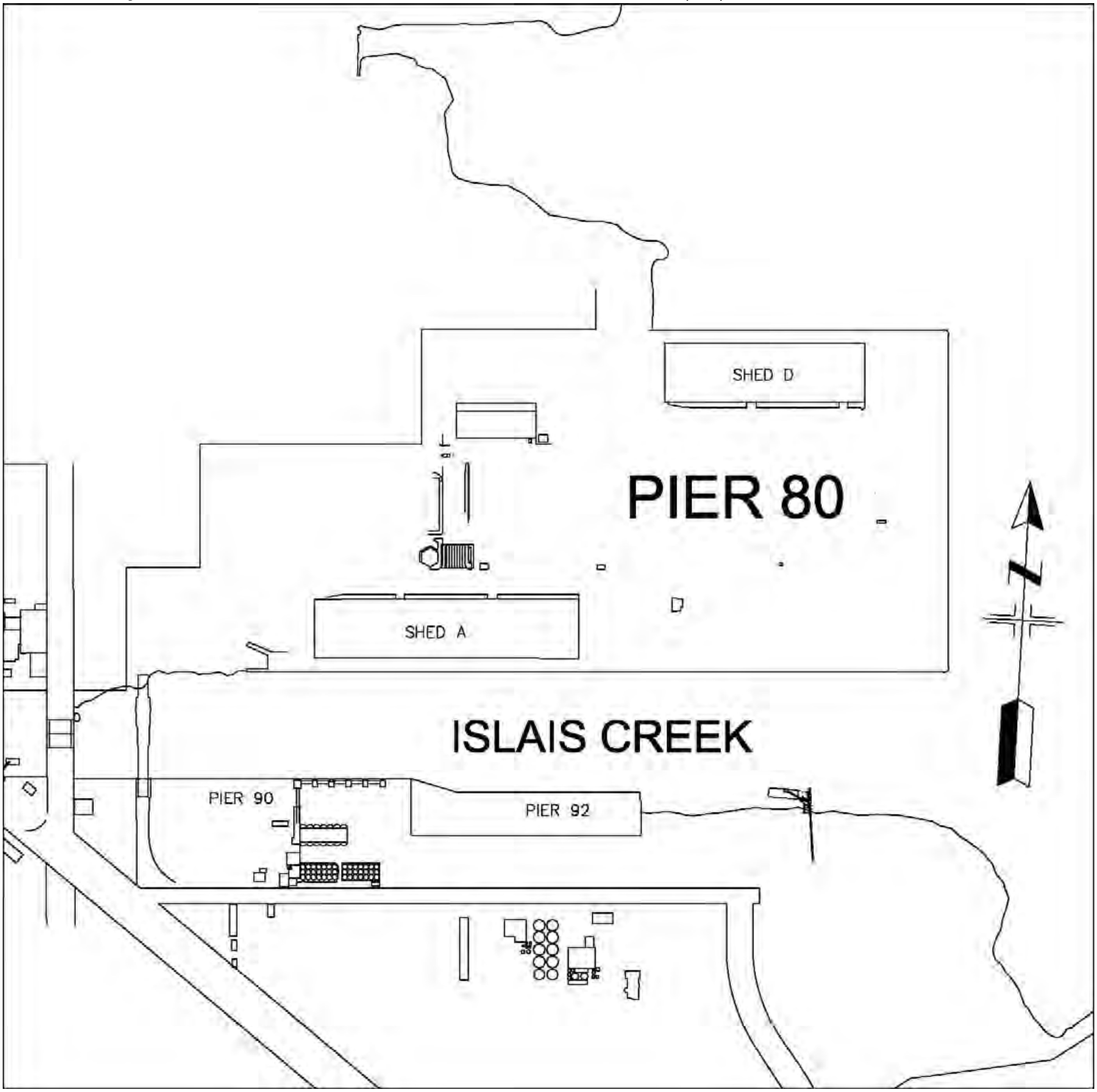
***Date of Evaluation:** June 15, 2011

(This space reserved for official comments.)



***Resource Name or #** (Assigned by recorder) Pier 80 Cargo Terminal

***Recorded by:** Mark Paez ***Date:** 6/15/11 ■ Continuation ☐ Update



State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary #
HRI #
Trinomial
NRHP Status Code

Other Listings
Review Code   Reviewer   Date

    ***Resource Name or #:** Pier 60 and restaurant building (former Carmen's Restaurant)

P1. Other Identifier:
***P2. Location:** ☐ **Not for Publication** ■ **Unrestricted**   ***a. County:** San Francisco
and (P2b and P2c or P2d. Attach a Location Map as necessary.)
***b. USGS 7.5' Quad:**   **Date:**   **T** ; **R** ; **¼ of** **¼ of Sec** **;** M.D. **B.M.**
c. Address: Pier 60, Mission Creek at Fourth Street Bridge   City: San Francisco   Zip: 94105
d. UTM: Zone: 10 ; mE/ mN (G.P.S.)
e. Other Locational Data: Assessor's Parcel 9900 Lot 060 (e.g., parcel #, directions to resource, elevation, etc., as appropriate)
Elevation:

***P3a. Description:** (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)

Pier 60 is a 30-foot-wide wharf that extends west from the Fourth Street Bridge approximately 200 feet in Mission Creek. A small single story rectangular wood-frme building is located at the east end of the pier. In 1994 the pier and restaurant building were evaluated by Carey and Company and determined to lack historic significance. Since that time the pier has deteriorated and determined structurally unsound by the Port Cjief Harbor Engineer. Fencing has been erected to secure the failing pier from the public. The restaurant building has been extensively damaged as a result of interior fires.

***P3b. Resource Attributes:** (List attributes and codes)
***P4. Resources Present:** ☒Building ☒Structure ☐Object ☐Site ☐District ☐Element of District ☐Other (Isolates, etc.)

P5a. Photo or Drawing (Photo required for buildings, structures, and objects.)

P5b. Description of Photo: South elevation of Pier 60 with restaurant building, Port of San Francisco, June 2011

***P6. Date Constructed/Age and Sources:** ☒Historic ☐Prehistoric ☐Both
Constructed circa 1915

***P7. Owner and Address:**
Port of San Francisco
Pier 1 The Embarcadero
San Francisco, CA 94111

***P8. Recorded by:** (Name, affiliation, and address)
Mark Paez
Historic Resources Manager
Port of San Francisco
Pier 1 The Embarcadero
San Francisco, CA 94111

***P9. Date Recorded:** June 15, 2011
***P10. Survey Type:** (Describe)
Reconnaissance

***P11. Report Citation:** San Francisco Planning Department, *The 34th America's Cup and James R. Herman Cruise Terminal and Northeast Wharf Plaza Draft EIR*, July 2011.

***Attachments:** ☒NONE ☐Location Map ☐Sketch Map ☐Continuation Sheet ☐Building, Structure, and Object Record ☐Archaeological Record ☐District Record ☐Linear Feature Record ☐Milling Station Record ☐Rock Art Record ☐Artifact Record ☐Photograph Record ☐ Other (List):

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary #
HRI #
Trinomial
NRHP Status Code

Other Listings
Review Code Reviewer Date

Page 1 of 1 *Resource Name or #: Pier 64 remnant piles along Mission Bay Shoreline

P1. Other Identifier:
***P2. Location:** ☐ Not for Publication ■ Unrestricted ***a. County:** San Francisco
and (P2b and P2c or P2d. Attach a Location Map as necessary.)
***b. USGS 7.5' Quad:** San Francisco **Date:** **T** ; **R** ; **¼ of** **¼ of Sec** **;** M.D. **B.M.**
c. Address: Pier 64 Mission Bay shorline near Terry Francois Blvd. and Mariposa Street City: San Francisco Zip: 94105

d. UTM: Zone: 10 ; mE/ mN (G.P.S.)
e. Other Locational Data: Assessors Parcel 9900 Lot 064 (e.g., parcel #, directions to resource, elevation, etc., as appropriate) Elevation:
***P3a. Description:** (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)

Remnant piles from the former Pier 64 which was demolished in the 1970's. A 1996 Historic Resources Database prepared for the Port identified Pier 64 as remnant piles and determined that portions of the surviving structure lacked integrity.

***P3b. Resource Attributes:** (List attributes and codes)
***P4. Resources Present:** ☐Building ☒Structure ☐Object ☐Site ☐District ☐Element of District ☐Other (Isolates, etc.)

P5a. Photo or Drawing (Photo required for buildings, structures, and objects.)

P5b. Description of Photo: Pier 64 remnant piles along Mission Bay shoreline looking northeast, Port of San Francisco, June 2011

***P6. Date Constructed/Age and Sources:** ☒Historic ☐Prehistoric ☐Both

Piles are presumed to be remnants from Pier 64 which was demolished in the 1970's

***P7. Owner and Address:**

Port of San Francisco
Pier 1 The Embarcadero
San Francisco, CA 94111

***P8. Recorded by:** (Name, affiliation, and address)
Mark Paez
Historic Resources Manager
Port of San Francisco
Pier 1 The Embarcadero
San Francisco, CA 94111

***P9. Date Recorded:** June 15, 2011
***P10. Survey Type:** (Describe) reconnaissance

***P11. Report Citation:** San Francisco Planning Department, *The 34th America's Cup and James R. Herman Cruise Terminal and Northeast Wharf Plaza Draft EIR*, July 2011.

***Attachments:** ☒NONE ☐Location Map ☐Sketch Map ☐Continuation Sheet ☐Building, Structure, and Object Record ☐Archaeological Record ☐District Record ☐Linear Feature Record ☐Milling Station Record ☐Rock Art Record ☐Artifact Record ☐Photograph Record ☐ Other (List):
DPR 523A (1/95) ***Required information**

APPENDIX NO

Noise and Vibration Supporting Information

NO-1. Generator Noise Calculations

NO-2. Final Helicopter Noise Analysis

APPENDIX NO-1
Generator Noise Calculations

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NOI-3

Americas Cup - 210317

Generator Noise Calculation

Location: Alcatraz

Year: 2012 and 2013

Generators Proposed:

	Noise Rating per Generac Spec Sheet (weather Enclosure only)			Number Proposed
400 kw Twin Diesel	89	dBA @ 23 feet	794328235	1
144 kw diesel	81.1	dBA @ 23 feet	128824955	0
60 kW Diesel	80.5	dBA @ 23 feet	112201845	1

Composit noise level at 23 feet =	89.57	dBA @ 23 feet
Distance to nearest receptor =	7920	feet (assumes 1.5 miles to receptor)
Reference Distance =	23	feet
Noise level at Receptor =	**38.83**	**dBA**

NOI-4

Americas Cup - 210317

Generator Noise Calculation

Location: Cavallo Point

Year: 2012 and 2013

Generators Proposed:

	Noise Rating per Generac Spec Sheet (weather Enclosure only)			Number Proposed
400 kw Twin Diesel	89	dBA @ 23 feet	794328235	2
144 kw diesel	81.1	dBA @ 23 feet	128824955	2
60 kW Diesel	80.5	dBA @ 23 feet	112201845	1

Composit noise level at 23 feet =	92.92	dBA @ 23 feet	
Distance to nearest receptor =	1660	feet	
Reference Distance =	23	feet	
Noise Contribution at Receptor =	**55.75**	**dBA**	375980.13
Existing Noise Level at Receptor =	49	dBA	79432.823
Resultant noise level at Receptor =	**56.58**	**dBA**	

Americas Cup - 210317

Generator Noise Calculation

Location: Crissy Field

Year: 2012

Generators Proposed:

	Noise Rating per Generac Spec Sheet (weather Enclosure only)			Number Proposed
400 kw Twin Diesel	89	dBA @ 23 feet	794328235	1
144 kw diesel	81.1	dBA @ 23 feet	128824955	1
60 kW Diesel	80.5	dBA @ 23 feet	112201845	1

Composit noise level at 23 feet = 90.15 dBA @ 23 feet

NO1-5

Distance to nearest receptor = 1000 feet (assumes 1.5 miles to receptor)
Reference Distance = 23 feet
Noise level at Receptor = 57.39 dBA

Year: 2013

Generators Proposed:

	Noise Rating per Generac Spec Sheet (weather Enclosure only)			Number Proposed
400 kw Twin Diesel	89	dBA @ 23 feet	794328235	2
144 kw diesel	81.1	dBA @ 23 feet	128824955	0
60 kW Diesel	80.5	dBA @ 23 feet	112201845	0

Composit noise level at 23 feet = 92.01 dBA @ 23 feet

Distance to nearest receptor = 1000 feet (assumes 1.5 miles to receptor)

Reference Distance =	23	feet	
Noise Contribution at Receptor =	59.24	dBA	840399.27
Existing Noise Level at Receptor =	62.3	dBA	1698243.7
Resultant noise level at Receptor =	64.05	**dBA**	

NOI-7

Americas Cup - 210317

Generator Noise Calculation

Location: Fort Mason

Year: 2013

Generators Proposed:

	Noise Rating per Generac Spec Sheet (weather Enclosure only)			Number Proposed
400 kw Twin Diesel	89	dBA @ 23 feet	794328235	0
144 kw diesel	81.1	dBA @ 23 feet	128824955	2
60 kW Diesel	80.5	dBA @ 23 feet	112201845	0

Composit noise level at 23 feet =	84.11	dBA @ 23 feet	
Distance to nearest receptor =	1100	feet (assumes 1.5 miles to receptor)	
Reference Distance =	23	feet	
Noise Contribution at Receptor =	50.52	dBA	112641.99
Existing Noise Level at Receptor =	68	dBA	6309573.4
Resultant noise level at Receptor =	68.08	**dBA**	

Americas Cup - 210317

Generator Noise Calculation

Location: Marina Green (AC Village)

Year: 2012 and 2013

Generators Proposed:

	Noise Rating per Generac Spec Sheet (Level 1 Enlosure for Mitigation)			Number Proposed
400 kw Twin Diesel	84	dBA @ 23 feet	251188643	2
144 kw diesel	76.2	dBA @ 23 feet	41686938	2
60 kW Diesel	74.7	dBA @ 23 feet	29512092	1

Composit noise level at 23 feet =	87.89	dBA @ 23 feet	
Distance to nearest receptor =	300	feet (assumes placement of generators at back of Green)	
Reference Distance =	23	feet	
Noise Contrubution at Receptor =	**65.58**	**dBA**	3616380.7
Existing Noise Level at Receptor =	63.2	dBA	2089296.1
Resultant noise level at Receptor =	**67.56**	**dBA**	

NOI-8

Americas Cup - 210317

Generator Noise Calculation

Location: Marina Green (AC Village)

Year: 2012 and 2013

Generators Proposed:

	Noise Rating per Generac Spec Sheet (weather Enclosure only)			Number Proposed
400 kw Twin Diesel	89	dBA @ 23 feet	794328235	2
144 kw diesel	81.1	dBA @ 23 feet	128824955	2
60 kW Diesel	80.5	dBA @ 23 feet	112201845	1

Composit noise level at 23 feet =	92.92	dBA @ 23 feet	
Distance to nearest receptor =	300	feet (assumes placement of generators at back of Green)	
Reference Distance =	23	feet	
Noise Contrubution at Receptor =	**70.61**	**dBA**	11511676
Existing Noise Level at Receptor =	63.2	dBA	2089296.1
Resultant noise level at Receptor =	**71.34**	**dBA**	

NOI-10

Americas Cup - 210317

Generator Noise Calculation

Location: Pier 19

Year: 2013

Generators Proposed:

	Noise Rating per Generac Spec Sheet (weather Enclosure only)			Number Proposed
400 kw Twin Diesel	89	dBA @ 23 feet	794328235	2
144 kw diesel	81.1	dBA @ 23 feet	128824955	2
60 kW Diesel	80.5	dBA @ 23 feet	112201845	0

Composit noise level at 23 feet =	92.66	dBA @ 23 feet		
Distance to nearest receptor =	900	feet	(assumes located behind Hospitality Area)	
Reference Distance =	23	feet		
Noise Contribution at Receptor =	60.81	dBA		1205797.6
Existing Noise Level at Receptor =	58.5	dBA		707945.78
Resultant noise level at Receptor =	62.82	**dBA**		

Americas Cup - 210317

Generator Noise Calculation

Location: Pier 23

Year: 2013

Generators Proposed:

	Noise Rating per Generac Spec Sheet (weather Enclosure only)			Number Proposed
400 kw Twin Diesel	89	dBA @ 23 feet	794328235	2
144 kw diesel	81.1	dBA @ 23 feet	128824955	2
60 kW Diesel	80.5	dBA @ 23 feet	112201845	0

Composit noise level at 23 feet =	92.66	dBA @ 23 feet	
Distance to nearest receptor =	900	feet	(assumes located behind Hospitality Area)
Reference Distance =	23	feet	
Noise Contribution at Receptor =	60.81	dBA	1205797.6
Existing Noise Level at Receptor =	58.5	dBA	707945.78
Resultant noise level at Receptor =	62.82	**dBA**	

NO1-12

Americas Cup - 210317

Generator Noise Calculation

Location: Pier 27

Year: 2013

Generators Proposed:

	Noise Rating per Generac Spec Sheet (Level 1 Enlosure for Mitigation)			Number Proposed
400 kw Twin Diesel	84	dBA @ 23 feet	251188643	6
144 kw diesel	76.2	dBA @ 23 feet	41686938	6
60 kW Diesel	80.5	dBA @ 23 feet	112201845	0

Composit noise level at 23 feet =	92.45	dBA @ 23 feet	
Distance to nearest receptor =	500	feet	(assumes located in "back of House" area)
Reference Distance =	23	feet	
Noise Contribution at Receptor =	65.70	dBA	3718348.4
Existing Noise Level at Receptor =	63	dBA	1995262.3
Resultant noise level at Receptor =	67.57	**dBA**	

Americas Cup - 210317

Generator Noise Calculation

Location: Pier 27

Year: 2013

Generators Proposed:

	Noise Rating per Generac Spec Sheet (weather Enclosure only)			Number Proposed
400 kw Twin Diesel	89	dBA @ 23 feet	794328235	6
144 kw diesel	81.1	dBA @ 23 feet	128824955	6
60 kW Diesel	80.5	dBA @ 23 feet	112201845	0

Composit noise level at 23 feet =	97.43	dBA @ 23 feet	
Distance to nearest receptor =	500	feet	(assumes located in "back of House" area)
Reference Distance =	23	feet	
Noise Contribution at Receptor =	70.69	dBA	11720353
Existing Noise Level at Receptor =	63	dBA	1995262.3
Resultant noise level at Receptor =	71.37	**dBA**	

Americas Cup - 210317

Generator Noise Calculation

Location: Pier 30-32

Year: 2013

Generators Proposed:

	Noise Rating per Generac Spec Sheet (weather Enclosure only)			Number Proposed
400 kw Twin Diesel	89	dBA @ 23 feet	794328235	2
144 kw diesel	81.1	dBA @ 23 feet	128824955	1
60 kW Diesel	80.5	dBA @ 23 feet	112201845	1

Composit noise level at 23 feet =	92.62	dBA @ 23 feet		
Distance to nearest receptor =	500	feet	(assumes located behind Hospitality Area)	
Reference Distance =	23	feet		
Noise Contribution at Receptor =	65.88	dBA		3871609.8
Existing Noise Level at Receptor =	68.9	dBA		7762471.2
Resultant noise level at Receptor =	70.66	**dBA**		

APPENDIX NO-2
Final Helicopter Noise Analysis

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FINAL HELICOPTER NOISE ANALYSIS

America's Cup 34 Events

Methodology

Integrated Noise Model

The Integrated Noise Model (INM), Version 7.0b, was used to quantify helicopter noise exposure in the vicinity of a helipad location and along the race course. The INM is the FAA-approved noise model for quantifying fixed-wing and rotary-wing aircraft noise. The INM input requires information specific to each helipad including the total number of helicopter operations, the flight paths followed, the specific helicopter types, and the time of day at which the operations occurred.

The INM works by defining a network of grid points at ground level. It then selects the shortest distance from each grid point to each flight track and computes the noise exposure generated by each helicopter (or aircraft) operation along each flight track. Corrections are applied for atmospheric attenuation, acoustical shielding of the engines by the helicopter, and speed variations. The noise exposure levels for each operation are then summed at each grid location. The cumulative noise exposure levels at all grid points are then used to develop Community Noise Equivalent Level (CNEL) contours for selected values (e.g. 65, 70, and 75 dB CNEL). Using the results of the grid point analysis, noise contours of equal noise exposure are then plotted. The INM includes the ability to model the effects of changes in ground elevations (terrain), but does not include the ability to account for shielding or reflectivity of noise from buildings or other structures.

Cumulative Noise Metrics

Cumulative noise metrics have been developed to assess community response to noise. These metrics account for the loudness of the noise, the duration of the noise, the total number of noise events, and the time of day these events occur into one single number rating scale.

- *Community Noise Equivalent Level (CNEL)* – CNEL contours have been prepared for the America's Cup and associated events in 2012 and 2013. Title 21 of the California State Aeronautics Act specifies the use of CNEL for quantifying cumulative aircraft noise exposure. CNEL is the 24-hour average sound level in decibels with an additional weighting placed on evening (7:00:00 pm – 9:59:59 pm) and nighttime (10:00:00 pm – 6:59:59 am) operations to account for the increased sensitivity people have to noise events during these hours. The CNEL metric and the evening and nighttime weights are described in detail in the "Time of Day" section below.

Title 21 of the State Aeronautics Act provides that areas exposed to aircraft noise levels less than 65 dB CNEL for an average annual day are acceptable for residential and other noise sensitive uses. Therefore, the 65 dB CNEL contours for race day events was modeled.

The specific data used to model the CNEL contours is described in the following sections.

Helicopter Operations and Fleet

A barge will be temporarily located in the San Francisco Bay to serve as a helipad for the helicopters to land at between races. The modeling has assumed six races per day for both the 2012 and 2013 competitions. Three helicopters were modeled operating on event days for the each year. One departure and one arrival to the temporary barge helipad for each race were included in the INM. This totals 36 operations per day for the 2012 World Series and for the 2013 America's Cup competition (one departure and one arrival equal two operations). According to the event organizers, the Environmental Impact Report (EIR) assumes there will be two World Series Events with each event consisting of eight race days. The 2013 scenario would have up to six races per day and a maximum of 30 race days. The helicopter types included two Bell 206L Long Ranger's and one Robinson R-44 for each year.

Time of Day

As noted previously, the separation of helicopter operations into daytime (7:00:00 am to 6:59:59 pm), evening (7:00:00 pm to 9:59:59 pm), and nighttime (10:00:00 pm – 6:59:59 am) is important because the INM includes an additional weighting during the evening and nighttime hours to account for the increased sensitivity people have to noise events during these hours. Evening operations are weighted as three daytime operations and nighttime operations are weighted as ten daytime operations. This results in a 4.77 and 10 decibel penalty for each helicopter operation during these periods, respectively. The modeling effort assumed that all helicopter operations would occur during daytime hours.

A detailed breakdown of the race day overflight operations by specific helicopter type is included in Table 1. Tables 2 and 3 identify the average annual day operations modeled for 2012 and 2013 respectively. The average annual day is used to generate the CNEL contours. The increase in operations in 2013 is due to the fact that more races will occur than in 2012.

TABLE 1
2012 AND 2013 RACE-DAY OVERFLIGHT OPERATIONS

INM Helicopter Type	Helicopter Type	Daytime Operations	Evening Operations	Nighttime Operations	Total
B206L	Bell 206L Long Ranger	24.0	0.0	0.0	24.0
R44	Robinson R44 Raven	12.0	0.0	0.0	12.0
Total		36.0	0.0	0.0	36.0

SOURCE: ESA Airports, 2011

TABLE 2
2012 AVERAGE ANNUAL DAY OPERATIONS

INM Helicopter Type	Helicopter Type	Daytime Operations	Evening Operations	Nighttime Operations	Total
B206L	Bell 206L Long Ranger	1.05	0.0	0.0	1.05
R44	Robinson R44 Raven	0.53	0.0	0.0	0.53
Total		1.58	0.0	0.0	1.58

SOURCE: ESA Airports, 2011

TABLE 3
2013 AVERAGE ANNUAL DAY OPERATIONS

INM Helicopter Type	Helicopter Type	Daytime Operations	Evening Operations	Nighttime Operations	Total
B206L	Bell 206L Long Ranger	1.97	0.0	0.0	1.97
R44	Robinson R44 Raven	0.99	0.0	0.0	0.99
Total		2.96	0.0	0.0	2.96

SOURCE: ESA Airports, 2011

Flight Tracks

Helicopter flight tracks are an important factor in determining the geographic distribution of noise on the ground. Flight tracks for helicopter operations follow the race course and include a one-half mile buffer on either side to account for the variations of individual helicopter flights. The modeled flight track area is shown on Figure NO-1.

In order to cover the race, the modeling assumed the helicopters will be flying at relatively low altitudes. The Jet Rangers were modeled at 100 feet above sea level (ASL) and the Robinson-44s at 300 feet ASL at an average speed of 30 knots while in flight and included 15 minutes of hovering time per race. In order to model the hovering periods, the race course was divided into three equal segments. The helicopters were modeled hovering for five minutes at each of these areas. The modeled locations of the helicopters hovering are shown on Figure NO-1.

CNEL Contours

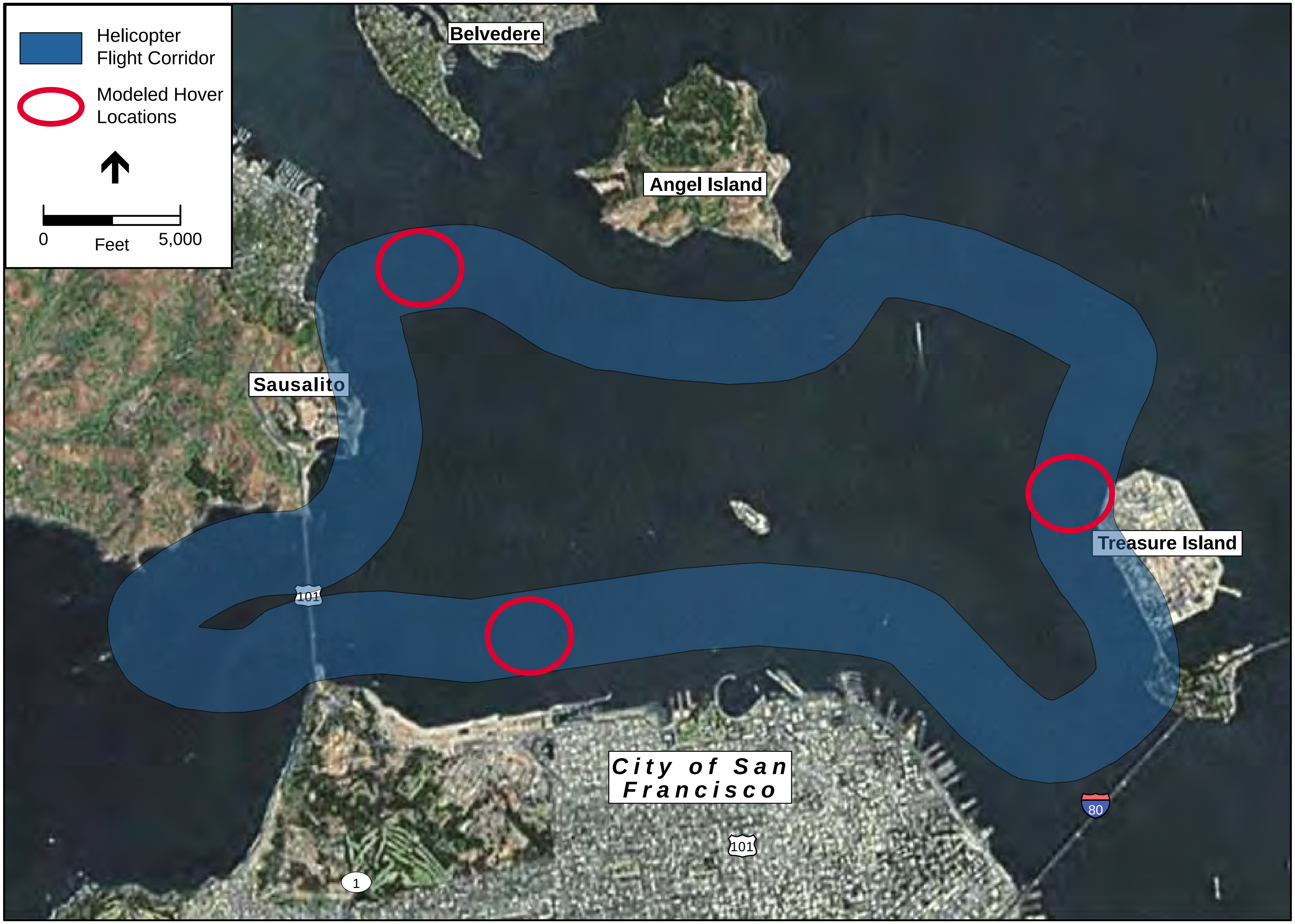
A temporary barge helipad has been included in the modeling effort. All helicopter flights were modeled to operate from this helipad in order to determine the size of the 65 dB CNEL contour at the helipad and the noise exposure along the race course. The average annual day helicopter operations for 2012 and 2013 did not generate noise levels equal to or greater than 65 dB CNEL over any noise sensitive land use in proximity to the race course.

The 65 dB CNEL for 2012 is approximately 0.006 square miles in size, is generally circular in shape, and is centered on the helipad. Figure NO-2 depicts the dimensions of the 2012 65 dB CNEL contour around the helipad.

The 65 dB CNEL for 2013 is approximately 0.011 square miles in size, is generally a circular in shape, and is centered on the helipad. Figure NO-3 depicts the dimensions of the 2013 65 dB CNEL contour around the helipad. The 2013 65 dB CNEL contour is larger due to more race days in 2013 than in 2012.

Along the race course, the 65 dB CNEL contour remains over water along the entire length of the course and does not impact any noise sensitive sites. The 2012 contour is shown on Figure NO-4 and the 2013 contour is shown on Figure NO-5.

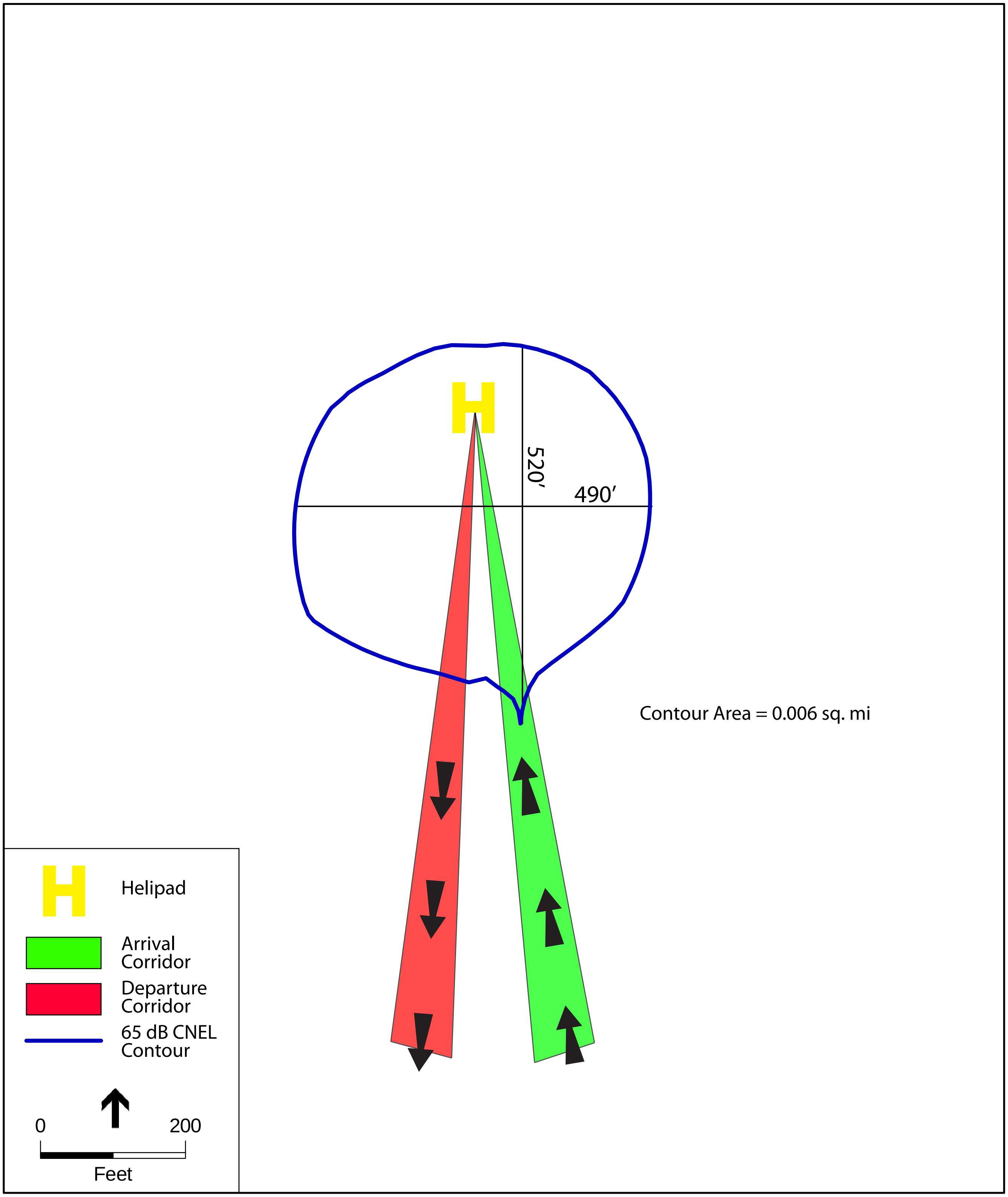
Title 21 of the State Aeronautics Act provides that areas exposed to aircraft noise levels less than 65 dB CNEL are acceptable for residential and other noise sensitive uses use. Therefore, to avoid a significant noise impact, the barge that will be used as a temporary helipad should be located at least 520 feet from the closest noise sensitive land use in 2012 and at least 810 feet from the closest noise sensitive land use in 2013.



SOURCE: ESA Airports, 2011; INM 7.0b; ESRI; Bing Maps

Case No. 2010.0493E: AC34 / Cruise Terminal and Northeast Wharf Plaza (210317)

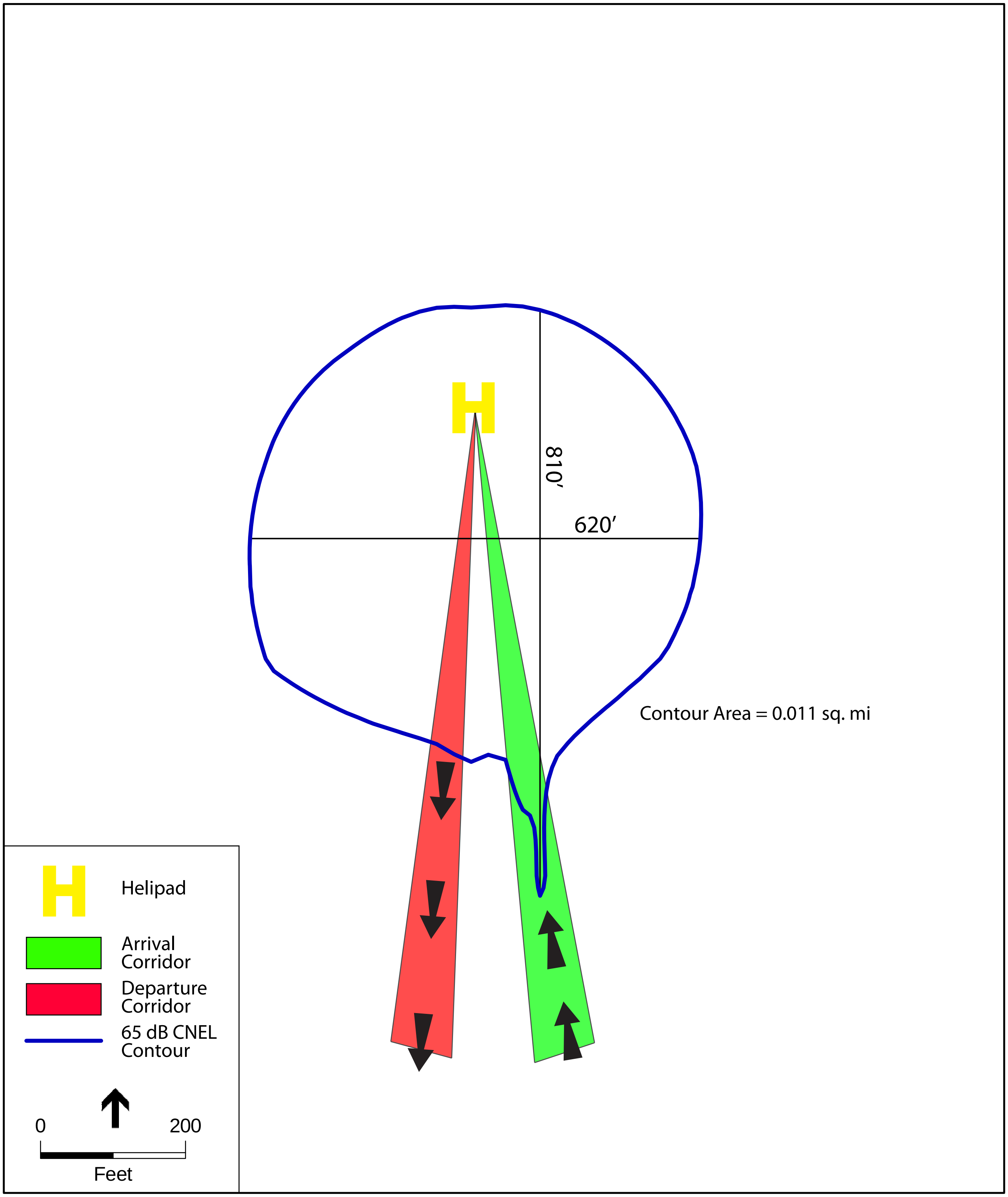
Figure NO-1
Helicopter Flight Corridor



SOURCE: ESA Airports, 2011; INM 7.0b

Case No. 2010.0493E: AC34 / Cruise Terminal and Northeast Wharf Plaza (210317)

Figure NO-2
Annual 65 dB CNEL Contour for Helipad for AC342012



SOURCE: ESA Airports, 2011; INM 7.0b

Case No. 2010.0493E: AC34 / Cruise Terminal and Northeast Wharf Plaza (210317)

Figure NO-3

Annual 65 dB CNEL Contour for Helipad for AC342013

SOURCE: ESA Airports, 2011; INM 7.0b; ESRI; Bing Maps

Case No. 2010.0493E: AC34 / Cruise Terminal and Northeast Wharf Plaza (210317)

Figure NO-4
Annual 65 dB Contour for Helicopters in Boat Race Area: AC34 2012

SOURCE: ESA Airports, 2011; INM 7.0b; ESRI; Bing Maps

Figure NO-5
Annual 65 dB Contour for Helicopters in Boat Race Area: AC34 2013

APPENDIX AQ

Air Quality Supporting Information

SECTION 1
Air Quality Methodology

As background for Section 5.8, Air Quality, of this EIR, this appendix provides information on the approach to the air quality analysis.

Approach to Analysis

Evaluation of air quality impacts from project operations and construction air emission sources under the Bay Area Air Quality District (BAAQMD) California Environmental Quality Act (CEQA) guidelines requires the enumeration of the estimated mass emissions of criteria air pollutants (CAPs) such as reactive organic gases (ROGs), nitrogen oxide (NOX), particulate matter 10 microns and smaller (PM_{10}), and particulate matter 2.5 microns and smaller ($PM_{2.5}$). In addition, an evaluation of potential human health effects from the emission of specific toxic air contaminants (TACs) present in the ROG or PM emissions is also required. The following sections describe the emissions estimation, air dispersion modeling, and risk characterization methodologies that were used to evaluate project and project-related construction emissions.

Chemical Selection and Emission Estimation

Construction and operational emissions of the AC34 and cruise terminal/wharf plaza projects are assessed individually as recommended by BAAQMD guidance. Cumulative air quality impacts are discussed with regard to the near-term cumulative impacts of construction and operation of the America's Cup venues and events. The cruise terminal would be completed and in operation after the AC34 events and long-term (year 2035) cumulative impacts are assessed only with respect to the cruise terminal operations.

In order to evaluate risks and health hazards, construction exhaust emissions and operational emissions of criteria air pollutants and toxic air contaminants (TACs) were estimated by first collecting extensive information on all of the different types of air emissions sources involved in project construction and the level of activity anticipated from these sources during each phase of construction. This information was then combined with emission factors applicable to each source type to generate criteria pollutant emission estimates. Estimated emissions (or associated human health risk impacts) were then compared to BAAQMD significance thresholds.[1]

[1] BAAQMD, California Environmental Quality Act Air Quality Guidelines, May 2011.

Much of the construction activity for AC34 would consist of driving temporary piles for placement of temporary floating docks and removing the temporary docks and piles at the conclusion of race activities in 2013. Other on-water construction would include placement of wave attenuators and driving of permanent piles. Emissions estimates for these activities were based on numbers and hours of operation of equipment needed to drive piles for and placement of a unit length of floating dock. Emission factors for each equipment type were taken from the California Air Resources Board (CARB) OFFROAD 2007 model except for tugboats and other on-water equipment for which emission factors were taken from the San Francisco Bay Seaport Emissions Inventory and the Port of San Francisco Emissions Inventory.[2] These emissions were then scaled to the total length of floating docks to be placed at each location. Construction emissions for placement of a unit length of wave attenuators were assumed to be the same as for floating docks. Similarly, construction emissions for permanent pile driving were estimated on a per pile basis and scaled to the number of piles to be placed at each location.

Land-based construction activities for the AC34 project would consist of building demolition and temporary team base construction at Piers 30-32 and building demolition and construction of the cruise terminal "cold shell" at Piers 27-29. Equipment types and hours of operation for these activities were supplied by AECOM and combined with exhaust emission factors from the OFFROAD model to estimate total construction equipment emissions at each location. On-road vehicle emissions for construction were based on the following data: numbers and types of vehicles (worker vehicles, equipment delivery trucks) and number of trips anticipated for these vehicles as supplied by AECOM. Vehicle emission factors were taken from CARB's EMFAC 2007. Both onsite and offsite vehicle emissions were estimated and included in the total construction emissions. Details of the emissions calculations are provided in a later section of this appendix.

Phase 2 construction activities for the Cruise Terminal include completion of certain interior spaces (e.g. Customs and Border Protection offices), interior building equipment (e.g., screening facilities) and exterior maritime equipment (e.g., mobile gangway, bollards, and fendering) required for cruise terminal operations. The Northeast Wharf Plaza would also be constructed, including hardscape and landscape improvements and proposed ancillary structures for commercial and recreational services over a 2.5 acre area. These activities would involve the operation of standard construction equipment and criteria pollutant emissions were calculated using the URBEMIS2007 model, assuming a three month construction period in 2013. Calculations assumed fine grading activities for the 2.5 acre Northeast Plaza and general building construction activities for a 92,000 square foot structure. Paving and architectural coating activities were also included in the calculation.

Localized construction risk and hazard assessment for Phase 2 completion of the cruise terminal/wharf plaza were estimated based on the assumption that construction of the building "cold shell" for AC34 would account for 90 percent of the total cruise terminal construction

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2 Bay Planning Coalition, *SF Bay Area Seaports Air Emissions Inventory: Port of San Francisco 2005 Emissions Inventory*, prepared by Moffatt & Nichol and ENVIRON. June 2010.

emissions, with the remaining 10 percent of emissions being associated with completion of the cruise terminal and wharf plaza.

AC34 operation emissions were estimated based on activity data provided by AECOM and the Port. Emissions from spectator and other boats, boat lifts, generators, and other power equipment to be used at race venues were estimated from these activity levels and applicable emission factors derived from the OFFROAD model. Emissions from trucks that would be used to deliver supplies and equipment for race events were estimated based on numbers of trips for each truck type at each race venue as supplied by AECOM and trip emissions generated by CARB's EMFAC 2007 BURDEN model. The analysis accounted for incremental cruise ship hoteling[3] emissions at Pier 27 resulting from the removal of the shore-side power system installed at Pier 27 in 2010. The analysis also accounted for emissions from the re-location of the Bauer Transportation warehouse from Pier 27 to Pier 50, which were estimated using EMFAC2007 BURDEN model for heavy heavy duty trucks. Estimates include emissions from travelling on the roadway immediately in front of the Pier, and maneuvering and idling on site. Emissions from increased passenger vehicle traffic associated with AC34 were calculated using traffic data provided by Adavant Consulting and EMFAC2007 BURDEN model.

Cruise terminal/wharf plaza operational emissions were estimated based on projected ship call data provided by the Port. Shore power is assumed to be unavailable in 2012 and 2013 due to construction and AC34-related activities at Pier 27. Shore power is assumed to be available again in time for the first ship call at Pier 27 in 2014. A variant was also evaluated in which shorepower does not become available until 2015. The distribution of ship calls between Pier 35 and Pier 27 and assumed percentage of calls at Pier 27 that would use shore power for all future years are detailed in a later section of this appendix. Shore power use rates were estimated to be in compliance with CARB's Shore Power Rule phase-in requirements. Cruise ship and assist tug emissions were estimated using the same methods as applied in a previous Port study. Onsite and offsite on-road vehicle emissions were based on projected numbers of vehicle trips as estimated by and trip emissions generated by the EMFAC 2007 BURDEN model. These estimates account for the projected increase in total annual passenger volume in future years. No data were available for provisioning truck trips but emissions from this activity are expected to be minimal. No other land-based emissions sources are expected at Pier 27. Loading of provisions and baggage handling are expected to be accomplished using electrically-powered equipment.

Emissions associated with helicopters frequenting the helipad during AC34 races were estimated using data provided by the project sponsor and EDMS software, developed by the United States Federal Aviation Administration (Emissions and Dispersion Modeling System (EDMS) Version 5.1, 2008, Office of Environment and Energy, Federal Aviation Administration.). Total CAP emissions (including those emitted in-flight) were evaluated for the project-wide emissions inventory; however, only TAC emissions expected to occur on or near the helipad (i.e. take-off, landing, flight within 100 feet above the helipad) were included for the risk assessment as a

[3] Hoteling refers to the period of time a cruise ship is at dock and generating its own power for lighting, heating and other necessary functions while at port in the absence of shoreside power.

screening analysis indicated TAC emissions from helicopters at flight altitudes are of sufficient distance from ground level receptors to not cause more than trace level exposure. As will be discussed later, a helipad located at Pier 80 was included in the multi-source AERMOD analysis; however, a screening-level analysis was also conducted for a helipad located at a variant location near Treasure Island.

Emissions associated with the future proposed BCDC fill removal sites were based on construction emissions for floating docks, assuming that fill removal site activities would generate the same emissions as construction for 1,200 linear feet of floating dock. This estimate is based on descriptions of the potential fill removal areas and is meant to be conservative.

For the evaluation of risks and hazards, the cancer risk and chronic non-cancer analyses are based on diesel particulate matter (DPM) concentrations and speciated total organic gases (TOG) emissions from gasoline exhaust. Diesel exhaust, a complex mixture that includes hundreds of individual constituents, is identified by the State of California as a known carcinogen. Under California regulatory guidelines, DPM is used as a surrogate measure of carcinogen exposure for the mixture of chemicals that make up diesel exhaust as a whole.

There is currently no acute non-cancer toxicity value available for DPM. Thus, speciated components of diesel ROGs provided by the BAAQMD were included in the acute non-cancer hazard analysis. Air toxic TOG components from gasoline exhaust were also included in the acute non-cancer analysis.

Air Dispersion Modeling

To evaluate TAC and $PM_{2.5}$ impacts from the project as compared to BAAQMD significance thresholds, near-field air dispersion modeling of DPM, TOG, and $PM_{2.5}$ from AC34 and cruise terminal construction and operational emission sources was conducted using the United States Environmental Protection Agency (U.S. EPA) American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD), version 11059,[4] as recommended by the BAAQMD in its CEQA guidelines. Three sources, the America's Cup Live Site venue, barge/helipad, and proposed future BCDC fill removal sites, were evaluated separately using the U.S. EPA AERSCREEN model because their exact locations were undetermined at the time of this analysis (as discussed in Section 5.8, Air Quality, of the EIR). Impacts from increased traffic due to the project were modeled separately in AERMOD along Lombard Street, which was identified as the street with the greatest predicted traffic increase due to AC34. For each receptor location, AERMOD generates 1-hour maximum and annual average air concentrations (or air dispersion factors, if unit emissions are modeled) that result from emissions from multiple sources. The ambient concentrations obtained through dispersion modeling were subsequently used in the risk assessment to quantify cancer and non-cancer health risk impacts and to evaluate $PM_{2.5}$

[4] U.S. EPA, *User's Guide for the AMS/EPA Regulatory Model (AERMOD)*, Office of Air Quality Planning and Standards, Emissions Monitoring and Analysis Division, Research Triangle Park, North Carolina, EPA-454/B-03-001, September 2004.

impacts. Air dispersion models such as AERMOD require a variety of inputs such as source parameters, meteorological parameters, topography information, and receptor parameters; each of these inputs is discussed below.

Receptor Locations

A fine receptor grid with 50-meter spacing was modeled from the shore (including marinas) to approximately 1,000 meters inland to evaluate health risks near the proposed cruise terminal and along the areas where race events or race-related activities would occur. Receptors were also modeled at the offshore spectator areas at Alcatraz, Treasure Island, and Cavallo Point. In addition, a coarser receptor grid with 500-meter spacing was modeled across the north and northeast areas of the city, as far south as Highway 101 and the Highway 280 interchange. Additional receptors were also added near the south side of Lombard street. These receptor grids included onsite receptors at all source locations, as spectators would be present during AC34 events. As there are no residential uses on AC34 event sites or other recreational and public gathering spaces around the waterfront, receptors were designated in two categories: (1) potential residential receptors, and (2) recreational receptors.

Receptors in the vicinity of the America's Cup Live Sites, the helipad and proposed future BCDC fill removal sites were evaluated in separate, screening-level analyses, due to the unavailability of the exact locations for these sources (see discussion below). Receptors in the vicinity of Lombard Street were evaluated separately in order to obtain risks for receptors near the roadway.

Emission Source Parameters

For this analysis, emissions associated with activities occurring at different event locations within adjacent areas (e.g., a pier or a spectator area) were combined and modeled as a uniform source group. For example, emissions associated with construction can occur in water areas (e.g., for dredging, floating dock installation) as well as on land (e.g., for pier improvements). Construction emissions were therefore grouped and distributed evenly over both the land and water construction areas of a given event location. Emissions from water vessels during AC34 race events (e.g., race support boats, race-sponsored spectator boats, and private large yachts) were modeled separately from land-based sources (e.g., forklifts and other equipment); furthermore, it was conservatively assumed that about 5 percent of total estimated emissions from race-sponsored boats and private large yachts located at the piers would be emitted in the vicinity of the piers. This assumption was based on assuming 1 hour of idling at the pier and 10 minutes under load while the vessels move to and from the pier. For smaller private boats, it was assumed that 50% of the total daily boats would be located in the nearshore area, and 100% of their emissions were emitted in this area. Each source location was modeled as an array of volume sources, in accordance with BAAQMD guidance for CEQA analyses.[5] Based on recommendations of the South Coast Air Quality Management District, for areas less than 5 acres,

[5] BAAQMD, Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 2.0, May 2011.

the area was represented by adjacent 10-meter-by-10-meter volume sources; for areas greater than 5 acres, adjacent 20-meter-by-20-meter volume sources were used. The Bauer Transportation sites at Pier 27 and Pier 50 were modeled similar to construction sources, with emissions spread evenly over the entire Pier area as well as the road in front of both Piers. For impacts of traffic along Lombard Street, adjacent volume sources were modeled along the roadway between Lyon Street and Van Ness to represent a line source.

This analysis also accounts for the incremental changes in ocean going vessel and tug-related emissions associated with Piers 35 and 27, both before and after the opening of the new cruise terminal. Hoteling emissions were modeled as single-point sources in the berthing areas near Pier 27 and Pier 35, while transit and maneuvering emissions were modeled as a line of volume sources between the two piers. Additional hoteling emissions (relative to 2011) were modeled during AC34 construction and operation and prior to the opening of the new cruise terminal, to account for the temporary shutdown of shorepower facilities. After the Pier 27 cruise terminal becomes operational, the analysis accounts for the gradual increase in shorepower usage at Pier 27 from 50 percent in 2014 up to 80 percent by 2020. The analysis also accounts for the changes in transit and maneuvering emissions that would result with the increase in port calls from 61 to 80 in 2012, and the change in call distribution between the two piers.

The emission rate from a source location may not be continuous or constant throughout a given day; this depends on the schedule of emissions-generating activities. Based on the project description, AC34 and cruise terminal construction was assumed to occur from 7:00 a.m. to 5:00 p.m.; AC34 race day emissions were assumed to occur from 9:00 a.m. to midnight, and cruise terminal emissions were assumed to be released continuously throughout the day. Emissions from the Bauer Transportation facilities were assumed to occur between 6:00 a.m. to midnight , and the helipad emissions were assumed to be released between 11:00 am and 5:00 pm.

The air dispersion modeling was conducted in order to derive dispersion factors, i.e., each source was assigned unit emission rates (i.e., 1 g/s), and the model estimates dispersion factors (with units of ($\mu g/m^3$)/ (g/s)). To determine the annual average ambient air concentrations of $PM_{2.5}$ and of individual TACs (including DPM) for use in estimating cancer and non-cancer chronic hazards, the annual average dispersion factors were then multiplied by the annual average emission rates from each source. For acute non-cancer hazard analyses, the 1-hour maximum dispersion factor estimates were used. These dispersion factors were multiplied by the maximum 1-hour emission rate for each acute TAC to derive maximum 1-hour air concentrations.

Meteorological and Terrain Data

Air dispersion modeling applications require the use of meteorological data that ideally are spatially and temporally representative of conditions in the immediate vicinity of the site under consideration. Based on an evaluation of wind speeds and wind directions in and around the study area, the Mission Bay meteorological site operated by the BAAQMD was determined to provide the most representative data set for this analysis. The meteorological data preprocessor to AERMOD, AERMET, was used in conjunction with the data collected at Mission Bay and parameters characteristic of the land surface surrounding the station to develop an AERMOD-ready meteorological data set. Upper air data measured at the Oakland International Airport were also used in the analysis. Elevation data for the sources and receptors were imported from the National Elevation Dataset maintained by United States Geological Survey.

AERSCREEN

The U.S. EPA screening model, AERSCREEN (version 11076),[6] was used to model the potential emissions due to generators used for the AC34 spectator venues and Live Sites, helipad (for the variant location at Treasure Island), and additional floating docks in San Francisco Bay. Generators were represented as point sources in AERSCREEN. The BAAQMD default source parameters for a point source diesel generator were used. Surface characteristics (albedo, bowen ratio, and roughness length) were based on AERMET summer defaults for an urban environment. The helipad and the fill removal site were modeled as volume sources with source parameters matching those of a construction source. The surface characteristics for this simulation were the AERMET default summer values for an open water environment. In both cases the AERMOD ready meteorological files with Mission Bay data were input to represent local meteorology.

Risk Characterization Methods

The following sections discuss the various components required for conducting the health risk analysis.

Exposure Assessment

Receptors

In order to evaluate incremental cancer risks to potentially exposed sensitive receptors, all receptors surrounding the project were assumed to be children from the onset of project operations in 2012 and continuing to reside at that location until age 70. This provides the most conservative estimate for health impacts, as the BAAQMD considers infants (ages 0-2) and children (ages 2-16) as being more sensitive to TAC exposure. (See discussion of cancer risk adjustment factors below.) Therefore, all AC34 activities, which would occur in 2012 and 2013, were evaluated assuming an infant was present in that location for all activities. As sensitive receptors may be present for AC34 events, receptors were evaluated on all piers and other public areas, designated as recreational receptors, as discussed earlier. A subset of the receptors were designated as "potential residential receptors" for areas of the waterfront that could be residential (see Figure later in section 2 of this appendix.).

6 U.S. EPA, *AERSCREEN User's Guide*, EPA-454/B-11-001, Office of Air Quality Planning and Standards, Air Quality Assessment Division, Research Triangle Park, North Carolina, March 2011.

Exposure Assumptions

The exposure parameters used for estimating excess lifetime cancer risks and chronic and acute non-cancer health indices (HI) for the resident population evaluated in this health risk assessment were obtained using risk assessment guidelines from the California Environmental Protection Agency (Cal/EPA) (2003) and the BAAQMD (2010), and are presented in **Table AQ-1**. As stated above, it was conservatively assumed that a receptor is born when the project begins and continues to be exposed to project-related emissions until age 70. Further, to evaluate potential health effects associated with potential exposure to emissions resulting from each phase of the project separately, exposure assumptions were identified in Table 5.8-7 for each phase of life corresponding to the four phases the project: (1) 2012, (2) 2013, (3) 2014 to 2027, and (4) 2028 to 2081.

Calculation of Intake

The dose estimated for the each exposure pathway is a function of the concentration of a chemical and the intake of that chemical. The intake factor for inhalation, IF_{inh}, can be calculated as follows:

$$IFinh = \frac{DBR * ET * EF * ED * CF}{AT}$$

Where:

IFinh	=	Intake Factor for Inhalation (m^3/kg-day)
DBR	=	Daily Breathing Rate (L/kg-day)
CF	=	Conversion Factor (m^3/L)
EF	=	Exposure Frequency (days/year)
ED	=	Exposure Duration (years)
AT	=	Averaging Time (days)

Estimated intake factors are presented in Table AQ-1. As discussed above, intakes are provided for each phase of the project separately. The chemical intake or dose is estimated by multiplying the inhalation intake factor, IF_{inh}, by the chemical concentration in air, C_i. When coupled with the chemical concentration, this calculation is mathematically equivalent to the dose algorithm given in Office of Environmental Health Hazard Assessment (OEHHA) "Hot Spots" guidance.[7]

[7] California Environmental Protection Agency (Cal/EPA), *Air Toxics Hot Spots Program Risk Assessment Guidelines*, August 2003.

TABLE AQ-1
EXPOSURE PARAMETERS

Exposure Parameter	Units	2012 Infant (Birth to Age 1)	2013 Infant (Age 1 to 2)	2014-2027 Child (Age 2 to 16)	2028-2081 Adult (Age 16 to 70)
Daily Breathing Rate (DBR)[1]	[L/kg-day]	581	581	441.5	302
Exposure Time (ET)[2]	[hours/24 hours]	24	24	24	24
Exposure Frequency (EF)[3]	[days/year]	350	350	350	350
Exposure Duration (ED)	[years]	1.25	1.0	14.0	54.0
Averaging Time (AT)	[days]	25550	25550	25550	25550
Intake Factor, Inhalation (IF_{inh})	[m^3/kg-day]	0.01	0.008	0.08	0.2
Age Sensitivity Factor	--	10	10	3	1

EQUATIONS USED:

$IF_{inh} = DBR * ET * EF * ED * CF / AT$
Where: CF = 0.001 m^3/L

kg = kilogram
m^3 = cubic meters
L = Liter

NOTES:

1 Daily breathing rates (DBR) reflect default breathing rates from the BAAQMD (2010). The DBR for a resident (child age 2 to 16) represents the average for a child and adult assuming the resident is a child for 7 years (DBR of 581 L/kg-day) and is an adult for 7 years (DBR of 302 L/kg-day) between the ages of 2 and 16. This is consistent with Cal/EPA (2003) guidance, which recommends use of a child breathing rate for the first 9 years of life.
2 Exposure time for residents reflect default exposure time from the BAAQMD (2010).
3 Exposure frequency for residents reflects default exposure time from the BAAQMD (2010).

SOURCE: Bay Area Air Quality Management District (BAAQMD), *BAAQMD Air Toxics NSR Program Health Risk Screening Analysis (HRSA) Guidelines,* January 2010; California Environmental Protection Agency (Cal/EPA), *Air Toxics Hot Spots Program Risk Assessment Guidelines,* August 2003; California Office of Environmental Health Hazard Assessment (OEHHA), Technical Support Document for Cancer Potency Factors: Methodologies for derivation, listing of available values, and adjustments to allow for early life stage exposures, May 2009.

Toxicity Assessment

The toxicity assessment characterizes the relationship between the magnitude of exposure and the nature and magnitude of adverse health effects that may result from such exposure. For purposes of calculating exposure criteria to be used in risk assessments, adverse health effects are classified into two broad categories: cancer and non-cancer endpoints. Toxicity values used to estimate the likelihood of adverse effects occurring in humans at different exposure levels are identified as part of the toxicity assessment component of a risk assessment.

Consistent with Cal/EPA risk assessment guidance, ENVIRON used current Cal/EPA cancer and non-cancer toxicity values to estimate excess lifetime cancer risks and non-cancer hazard quotients (HQs) associated with exposure to emissions resulting from the project. Toxicity values used in this analysis were obtained from the OEHHA/CARB Consolidated Table of Approved Risk Assessment Health Values.

Cancer Risk Adjustment Factors

As recommended by the BAAQMD (2010), the estimated excess lifetime cancer risks for a resident child were adjusted using the approach described in the 2009 Cal/EPA OEHHA Technical Support Document (TSD). This approach accounts for an "anticipated sensitivity to carcinogens" of infants and children. Cancer risk estimates are weighted by an age-sensitivity factor (ASF) of 10 for exposures that occur from the third trimester of pregnancy to 2 years of age and by a factor of three for exposures that occur from 2 years to 16 years of age. No weighting factor (i.e., an ASF of 1, which is equivalent to no adjustment) is applied to ages from 16 to 70 years. Table AQ-1 shows the ASFs used for each resident receptor type.

Risk Characterization

Estimation of Cancer Risks

Excess lifetime cancer risks are estimated as the upper-bound incremental probability that an individual will develop cancer over a lifetime as a direct result of exposure to potential carcinogens. The estimated risk is expressed as a unitless probability. The cancer risk attributed to a chemical is calculated by multiplying the chemical intake or dose at the human exchange boundaries (e.g., lungs) by the chemical-specific cancer potency factor (CPF).

The equation used to calculate the potential excess lifetime cancer risk for the inhalation pathway is as follows:

$$Risk_{inh} = C_i \times CF \times IF_{inh} \times CPF_i \times ASF$$

Where:

$Risk_{inh}$	=	Cancer Risk; the incremental probability of an individual developing cancer as a result of inhalation exposure to a particular potential carcinogen (unitless)
C_i	=	Annual Average Air Concentration for $Chemical_i$ ($\mu g/m^3$)
CF	=	Conversion Factor (mg/μg)
IF_{inh}	=	Intake Factor for Inhalation (m^3/kg-day)
CPF_i	=	Cancer Potency Factor for $Chemical_i$ (mg chemical/kg body weight-day)-1
ASF	=	Age-Sensitivity Factor (unitless)

Estimation of Chronic Non-Cancer Hazard Quotients/Indices

The potential for exposure to result in chronic non-cancer effects is evaluated by comparing the estimated annual average air concentration (which is equivalent to the average daily air concentration) to the chemical-specific non-cancer chronic reference exposure levels (RELs). When calculated for a single chemical, the comparison yields a ratio termed a hazard quotient or

HQ. To evaluate the potential for adverse chronic non-cancer health effects from simultaneous exposure to multiple chemicals, the HQs for all chemicals are summed, yielding an HI.

The equations used to calculate the chemical-specific HQs and the overall HI are:

$$HQ_i = C_i / REL_i$$

$$HI = \Sigma HQ_i$$

Where:

HI	=	Hazard Index (unitless)
HQ_i	=	Hazard Quotient for $Chemical_i$ (unitless)
C_i	=	Annual Average Air Concentration for $Chemical_i$ ($\mu g/m^3$)
REL_i	=	Chronic Non-Cancer Reference Exposure Level for $Chemical_i$ ($\mu g/m^3$)

Estimation of Acute Non-Cancer Hazard Quotients/Indices

The potential for exposure to result in acute non-cancer effects is evaluated by comparing the estimated 1-hour maximum air concentration to the chemical-specific non-cancer acute REL. The estimation method for determining the 1-hour maximum concentration was described in the "Air Dispersion Modeling" section. When calculated for a single chemical, the comparison yields a ratio termed a hazard quotient or HQ. To evaluate the potential for adverse acute non-cancer health effects from simultaneous exposure to multiple chemicals, the HQs for all chemicals are summed, yielding an HI.

The equations used to calculate the chemical-specific HQs and the overall HI are:

$$HQ_i = Ci / REL_i$$

$$HI = \Sigma HQ_i$$

Where:

HI	=	Hazard Index (unitless)
HQ_i	=	Hazard Quotient for $Chemical_i$ (unitless)
C_i	=	1-hour Maximum Air Concentration for $Chemical_i$ ($\mu g/m^3$)
REL_i	=	Acute Non-Cancer Reference Exposure Level for $Chemical_i$ ($\mu g/m^3$)

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SECTION 2
Health Risk Assessment Sample Results

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Cancer Risk Significance Exceedances
Recreational and Residential Receptors
Operations of AC34

Receptor ID	UTMx	UTMy	Cancer Risk (in a million)	Emission Type	Source
R0885	554,592.10	4,178,083.40	10.6	Operations	AC34
R0886	554,637.80	4,178,084.70	15.2	Operations	AC34
R0899	554,545.20	4,178,127.90	10.1	Operations	AC34
R0900	554,590.90	4,178,129.10	14.5	Operations	AC34
R0901	554,636.60	4,178,130.30	19.6	Operations	AC34
R0902	554,682.30	4,178,131.60	22.7	Operations	AC34
R0903	554,728.00	4,178,132.80	24.4	Operations	AC34
R0904	554,773.70	4,178,134.00	24.8	Operations	AC34
R0905	554,819.30	4,178,135.20	24.5	Operations	AC34
R0906	554,865.00	4,178,136.40	23.3	Operations	AC34
R0907	554,910.70	4,178,137.70	20.5	Operations	AC34
R0920	554,544.00	4,178,173.60	10.4	Operations	AC34
R0921	554,589.70	4,178,174.80	15.3	Operations	AC34
R0922	554,635.40	4,178,176.00	20.7	Operations	AC34
R0923	554,681.10	4,178,177.30	24.3	Operations	AC34
R0924	554,726.70	4,178,178.50	26.3	Operations	AC34
R0925	554,772.40	4,178,179.70	27.0	Operations	AC34
R0926	554,818.10	4,178,180.90	26.8	Operations	AC34
R0927	554,863.80	4,178,182.10	25.7	Operations	AC34
R0941	554,588.50	4,178,220.50	14.5	Operations	AC34
R0942	554,634.10	4,178,221.70	19.9	Operations	AC34
R0943	554,679.80	4,178,222.90	23.3	Operations	AC34
R0944	554,725.50	4,178,224.20	25.5	Operations	AC34
R0945	554,771.20	4,178,225.40	26.3	Operations	AC34
R0946	554,816.90	4,178,226.60	26.2	Operations	AC34
R0960	554,587.20	4,178,266.20	12.0	Operations	AC34
R0961	554,632.90	4,178,267.40	16.6	Operations	AC34
R0962	554,678.60	4,178,268.60	19.6	Operations	AC34
R0963	554,724.30	4,178,269.90	21.6	Operations	AC34
R0964	554,770.00	4,178,271.10	22.8	Operations	AC34
R0979	554,631.70	4,178,313.10	10.4	Operations	AC34
R0980	554,677.40	4,178,314.30	12.4	Operations	AC34
R0981	554,723.10	4,178,315.50	14.5	Operations	AC34
R1429	554,337.30	4,180,774.30	12.2	Operations	AC34
R1430	554,383.00	4,180,775.50	14.2	Operations	AC34
R1431	554,428.70	4,180,776.70	13.8	Operations	AC34
R1432	554,244.70	4,180,817.50	13.2	Operations	AC34
R1433	554,290.40	4,180,818.80	15.2	Operations	AC34
R1434	554,336.10	4,180,820.00	16.6	Operations	AC34
R1435	554,381.80	4,180,821.20	16.9	Operations	AC34
R1436	554,427.50	4,180,822.40	15.9	Operations	AC34

Receptor ID	UTMx	UTMy	Cancer Risk (in a million)	Emission Type	Source
R1442	553,969.40	4,180,855.90	13.0	Operations	AC34
R1443	554,015.00	4,180,857.10	14.6	Operations	AC34
R1444	554,060.70	4,180,858.30	15.4	Operations	AC34
R1445	554,106.40	4,180,859.60	16.2	Operations	AC34
R1446	554,152.10	4,180,860.80	16.4	Operations	AC34
R1447	554,197.80	4,180,862.00	16.9	Operations	AC34
R1448	554,243.50	4,180,863.20	17.4	Operations	AC34
R1449	554,289.20	4,180,864.40	18.5	Operations	AC34
R1450	554,334.90	4,180,865.70	18.7	Operations	AC34
R1451	554,380.60	4,180,866.90	18.2	Operations	AC34
R1452	554,426.30	4,180,868.10	16.6	Operations	AC34
R1458	553,968.10	4,180,901.60	13.6	Operations	AC34
R1459	554,013.80	4,180,902.80	15.9	Operations	AC34
R1460	554,059.50	4,180,904.00	16.9	Operations	AC34
R1461	554,105.20	4,180,905.20	17.6	Operations	AC34
R1462	554,150.90	4,180,906.50	18.3	Operations	AC34
R1463	554,196.60	4,180,907.70	18.5	Operations	AC34
R1464	554,242.30	4,180,908.90	18.5	Operations	AC34
R1465	554,288.00	4,180,910.10	18.9	Operations	AC34
R1466	554,333.70	4,180,911.40	18.8	Operations	AC34
R1467	554,379.30	4,180,912.60	17.9	Operations	AC34
R1468	554,425.00	4,180,913.80	16.2	Operations	AC34
R1474	553,966.90	4,180,947.30	12.5	Operations	AC34
R1475	554,012.60	4,180,948.50	14.1	Operations	AC34
R1476	554,058.30	4,180,949.70	14.4	Operations	AC34
R1477	554,104.00	4,180,950.90	14.6	Operations	AC34
R1478	554,149.70	4,180,952.20	16.1	Operations	AC34
R1479	554,195.40	4,180,953.40	16.4	Operations	AC34
R1480	554,241.10	4,180,954.60	16.3	Operations	AC34
R1481	554,286.70	4,180,955.80	16.4	Operations	AC34
R1482	554,332.40	4,180,957.00	16.1	Operations	AC34
R1483	554,378.10	4,180,958.30	15.2	Operations	AC34
R1484	554,423.80	4,180,959.50	14.2	Operations	AC34
R1490	553,965.70	4,180,993.00	10.6	Operations	AC34
R1704	553,920.50	4,182,683.50	11.0	Operations	AC34
R1720	553,965.00	4,182,730.40	15.8	Operations	AC34
R1759	553,779.80	4,182,816.90	10.3	Operations	AC34
R2084	553,070.00	4,183,712.40	10.0	Operations	AC34
R2085	553,207.10	4,183,716.10	10.3	Operations	AC34
R2109	552,977.40	4,183,755.70	10.5	Operations	AC34
R2110	553,023.10	4,183,756.90	11.0	Operations	AC34
R2111	553,251.50	4,183,763.00	11.6	Operations	AC34
R2141	552,884.80	4,183,798.90	10.2	Operations	AC34
R2142	552,930.50	4,183,800.10	11.2	Operations	AC34
R2143	552,976.20	4,183,801.30	12.4	Operations	AC34

Receptor ID	UTMx	UTMy	Cancer Risk (in a million)	Emission Type	Source
R2144	553,021.90	4,183,802.60	13.2	Operations	AC34
R2177	552,792.20	4,183,842.10	10.4	Operations	AC34
R2178	552,837.90	4,183,843.40	10.8	Operations	AC34
R2179	552,883.60	4,183,844.60	11.6	Operations	AC34
R2180	552,929.30	4,183,845.80	12.9	Operations	AC34
R2181	552,975.00	4,183,847.00	14.9	Operations	AC34
R2182	553,066.30	4,183,849.50	19.7	Operations	AC34
R2183	553,112.00	4,183,850.70	18.1	Operations	AC34
R2218	552,745.30	4,183,886.60	10.9	Operations	AC34
R2219	552,791.00	4,183,887.80	11.8	Operations	AC34
R2220	552,836.70	4,183,889.10	12.4	Operations	AC34
R2221	552,882.40	4,183,890.30	13.1	Operations	AC34
R2222	552,928.00	4,183,891.50	14.3	Operations	AC34
R2223	552,973.70	4,183,892.70	16.1	Operations	AC34
R2224	553,110.80	4,183,896.40	23.3	Operations	AC34
R2225	553,156.50	4,183,897.60	21.2	Operations	AC34
R2260	552,698.40	4,183,931.10	10.8	Operations	AC34
R2261	552,744.10	4,183,932.30	12.4	Operations	AC34
R2262	552,789.80	4,183,933.50	13.7	Operations	AC34
R2263	552,835.40	4,183,934.80	14.8	Operations	AC34
R2264	552,881.10	4,183,936.00	15.6	Operations	AC34
R2265	552,926.80	4,183,937.20	16.1	Operations	AC34
R2266	552,972.50	4,183,938.40	17.0	Operations	AC34
R2267	553,018.20	4,183,939.60	18.6	Operations	AC34
R2268	553,201.00	4,183,944.50	23.3	Operations	AC34
R2309	552,651.50	4,183,975.60	10.5	Operations	AC34
R2310	552,697.20	4,183,976.80	12.0	Operations	AC34
R2311	552,742.80	4,183,978.00	14.2	Operations	AC34
R2312	552,788.50	4,183,979.20	16.6	Operations	AC34
R2313	552,834.20	4,183,980.40	19.1	Operations	AC34
R2314	552,879.90	4,183,981.70	20.5	Operations	AC34
R2315	552,925.60	4,183,982.90	20.5	Operations	AC34
R2316	552,971.30	4,183,984.10	20.1	Operations	AC34
R2317	553,017.00	4,183,985.30	20.2	Operations	AC34
R2318	553,062.70	4,183,986.50	21.0	Operations	AC34
R2319	553,108.40	4,183,987.80	22.8	Operations	AC34
R2364	552,650.20	4,184,021.20	11.4	Operations	AC34
R2365	552,695.90	4,184,022.50	13.6	Operations	AC34
R2366	552,741.60	4,184,023.70	16.2	Operations	AC34
R2367	552,787.30	4,184,024.90	20.5	Operations	AC34
R2368	552,833.00	4,184,026.10	25.6	Operations	AC34
R2369	552,924.40	4,184,028.60	30.4	Operations	AC34
R2370	552,970.10	4,184,029.80	27.3	Operations	AC34
R2371	553,015.80	4,184,031.00	25.1	Operations	AC34
R2372	553,061.50	4,184,032.20	23.9	Operations	AC34

Receptor ID	UTMx	UTMy	Cancer Risk (in a million)	Emission Type	Source
R2373	553,107.10	4,184,033.50	23.7	Operations	AC34
R2420	552,603.30	4,184,065.70	10.1	Operations	AC34
R2421	552,649.00	4,184,066.90	12.0	Operations	AC34
R2422	552,694.70	4,184,068.20	14.8	Operations	AC34
R2423	552,740.40	4,184,069.40	18.1	Operations	AC34
R2424	552,786.10	4,184,070.60	25.2	Operations	AC34
R2425	552,831.80	4,184,071.80	34.1	Operations	AC34
R2426	552,877.50	4,184,073.00	44.0	Operations	AC34
R2427	553,014.50	4,184,076.70	34.5	Operations	AC34
R2428	553,060.20	4,184,077.90	29.6	Operations	AC34
R2429	553,105.90	4,184,079.10	27.4	Operations	AC34
R2478	552,602.10	4,184,111.40	10.6	Operations	AC34
R2479	552,647.80	4,184,112.60	12.7	Operations	AC34
R2480	552,693.50	4,184,113.80	15.6	Operations	AC34
R2481	552,739.20	4,184,115.10	21.4	Operations	AC34
R2482	552,784.90	4,184,116.30	30.3	Operations	AC34
R2483	552,830.60	4,184,117.50	47.1	Operations	AC34
R2484	552,876.30	4,184,118.70	54.2	Operations	AC34
R2485	552,921.90	4,184,120.00	56.9	Operations	AC34
R2486	553,059.00	4,184,123.60	39.2	Operations	AC34
R2547	552,600.90	4,184,157.10	10.8	Operations	AC34
R2548	552,646.60	4,184,158.30	13.0	Operations	AC34
R2549	552,692.30	4,184,159.50	17.5	Operations	AC34
R2550	552,738.00	4,184,160.80	26.6	Operations	AC34
R2551	552,783.60	4,184,162.00	38.9	Operations	AC34
R2552	552,829.30	4,184,163.20	55.9	Operations	AC34
R2553	552,966.40	4,184,166.90	62.9	Operations	AC34
R2554	553,012.10	4,184,168.10	58.3	Operations	AC34
R2610	552,599.70	4,184,202.80	10.2	Operations	AC34
R2611	552,645.40	4,184,204.00	12.4	Operations	AC34
R2612	552,691.00	4,184,205.20	18.0	Operations	AC34
R2613	552,736.70	4,184,206.50	31.2	Operations	AC34
R2614	552,828.10	4,184,208.90	59.7	Operations	AC34
R2615	552,873.80	4,184,210.10	68.7	Operations	AC34
R2616	553,010.90	4,184,213.80	62.4	Operations	AC34
R2677	552,644.10	4,184,249.70	10.8	Operations	AC34
R2678	552,689.80	4,184,250.90	15.1	Operations	AC34
R2679	552,735.50	4,184,252.10	29.2	Operations	AC34
R2680	552,872.60	4,184,255.80	67.1	Operations	AC34
R2681	552,918.30	4,184,257.00	72.2	Operations	AC34
R2747	552,688.60	4,184,296.60	12.4	Operations	AC34
R2748	552,734.30	4,184,297.80	25.6	Operations	AC34
R2826	552,733.10	4,184,343.50	22.4	Operations	AC34
R2893	552,731.90	4,184,389.20	20.2	Operations	AC34
R2981	552,684.90	4,184,433.70	11.0	Operations	AC34

Receptor ID	UTMx	UTMy	Cancer Risk (in a million)	Emission Type	Source
R2982	552,730.60	4,184,434.90	19.9	Operations	AC34
R3031	548,617.30	4,184,370.70	10.9	Operations	AC34
R3032	548,663.00	4,184,371.90	11.0	Operations	AC34
R3044	549,988.00	4,184,407.30	10.6	Operations	AC34
R3045	550,033.70	4,184,408.50	11.2	Operations	AC34
R3077	552,455.30	4,184,473.30	10.3	Operations	AC34
R3078	552,501.00	4,184,474.50	12.5	Operations	AC34
R3079	552,546.60	4,184,475.70	18.2	Operations	AC34
R3080	552,592.30	4,184,476.90	22.5	Operations	AC34
R3081	552,638.00	4,184,478.10	20.7	Operations	AC34
R3082	552,683.70	4,184,479.40	16.5	Operations	AC34
R3083	552,729.40	4,184,480.60	21.3	Operations	AC34
R3138	549,986.80	4,184,453.00	12.0	Operations	AC34
R3139	550,032.50	4,184,454.20	13.1	Operations	AC34
R3140	550,078.20	4,184,455.50	13.2	Operations	AC34
R3169	552,362.70	4,184,516.50	10.6	Operations	AC34
R3170	552,408.40	4,184,517.70	11.6	Operations	AC34
R3171	552,454.00	4,184,519.00	13.5	Operations	AC34
R3172	552,499.70	4,184,520.20	15.5	Operations	AC34
R3173	552,636.80	4,184,523.80	35.8	Operations	AC34
R3174	552,682.50	4,184,525.10	26.7	Operations	AC34
R3175	552,728.20	4,184,526.30	25.5	Operations	AC34
R3201	548,112.30	4,184,448.60	10.0	Operations	AC34
R3202	548,158.00	4,184,449.90	10.0	Operations	AC34
R3203	548,203.60	4,184,451.10	10.1	Operations	AC34
R3204	548,249.30	4,184,452.30	10.1	Operations	AC34
R3205	548,295.00	4,184,453.50	10.3	Operations	AC34
R3206	548,340.70	4,184,454.70	10.0	Operations	AC34
R3207	548,386.40	4,184,456.00	10.0	Operations	AC34
R3208	548,432.10	4,184,457.20	10.1	Operations	AC34
R3209	548,477.80	4,184,458.40	10.2	Operations	AC34
R3210	548,523.50	4,184,459.60	10.3	Operations	AC34
R3211	548,569.20	4,184,460.80	10.2	Operations	AC34
R3212	548,614.90	4,184,462.10	10.2	Operations	AC34
R3215	549,208.80	4,184,477.90	10.1	Operations	AC34
R3216	549,254.50	4,184,479.20	10.2	Operations	AC34
R3217	549,300.20	4,184,480.40	10.2	Operations	AC34
R3218	549,345.90	4,184,481.60	10.2	Operations	AC34
R3219	549,391.60	4,184,482.80	10.2	Operations	AC34
R3220	549,437.30	4,184,484.00	10.1	Operations	AC34
R3227	549,985.60	4,184,498.70	12.8	Operations	AC34
R3228	550,031.20	4,184,499.90	14.8	Operations	AC34
R3229	550,076.90	4,184,501.10	15.2	Operations	AC34
R3230	550,122.60	4,184,502.40	14.9	Operations	AC34
R3231	550,168.30	4,184,503.60	13.0	Operations	AC34

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SECTION 3
Air Quality Calculation Sheets

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CONSTRUCTION EQUIPMENT

2012 AC34 Construction Equipment Activity Data Summary

Location	Activity/Components	Equipment Type	Equipment Count	HP	Fuel Type	Duration (days)	Operating Hours per Day
		Hoe-ram	1	180	D	5	6.0
		Backhoe /loader	2	180	D	5	6.0
Pier 30-32	Demolition of bldg	Portable generators & jack hammers	2	80	D	5	5.0
		Mobil Crane	1	300	D	5	5.0
Pier 80	Installation of floating docks/piles	Vibratory Pile Driver	1	100	D	2	8.0
Pier 80	Removal of floating docks/piles	Mobil Cranes	1	300	D	2	8.0
		Boomlift	1	83	D	60	10.0
		5k Warehouse lift	8	41	D	60	10.0
		10k Reach forklift	4	99	D	60	10.0
Pier 80	Installation of team base	Event 4000w Light Tower	4	12	D	60	10.0
		Mobil Crane	1	300	D	3	5.0
AC Village	Installation of floating docks/piles	Vibratory Pile Driver	1	100	D	2	8.0
AC Village	Removal of floating docks/piles	Mobil Cranes	1	300	D	3	8.0
	Installation of Piles to Support	Mobil Crane	1	300	D	5	5.0
Fort Mason	Communication Barge	Vibratory Pile Driver	1	100	D	2	8.0

2013 AC34 Construction Equipment Activity Data Summary

Location	Activity/Components	Equipment Type	Equipment Count	HP	Fuel Type	Duration (days)	Operating Hours per Day
		Mobil Crane	1	300	D	2	5.0
Pier 1	Installation of floating docks/piles	Vibratory Pile Driver	1	100	D	1	8.0
Pier 1	Removal of floating docks/piles	Mobil Cranes	1	300	D	1	8.0
Pier 9-15 Water		Mobil Crane	1	300	D	2	5.0
Basin	Installation of floating docks/piles	Vibratory Pile Driver	1	100	D	1	8.0
Pier 9-15 Water Basin	Removal of floating docks/piles	Mobil Cranes	1	300	D	1	8.0
		Mobil Crane	1	300	D	2	5.0
Pier 17-19	Installation of floating docks/piles	Vibratory Pile Driver	1	100	D	1	8.0
Pier 17-19	Removal of floating docks/piles	Mobil Cranes	1	300	D	1	8.0
		Mobil Crane	1	300	D	8	5.0
Pier 23	Installation of floating docks/piles	Vibratory Pile Driver	1	100	D	3	8.0
	Installation of Piles to Support	Mobil Crane	1	300	D	5	5.0
Pier 23	Communication Barge	Vibratory Pile Driver	1	100	D	2	8.0
Pier 23	Removal of floating docks/piles	Mobil Cranes	1	300	D	4	8.0

CONSTRUCTION EQUIPMENT

Pier 23	Removal of Piles to Support Communication Barge	Mobil Cranes	1	300	D	2	8.0
		Mobil Crane	1	300	D	12	5.0
Pier 26-28	Installation of floating docks/piles	Vibratory Pile Driver	1	100	D	5	8.0
Pier 26-28	Removal of floating docks/piles	Mobil Cranes	1	300	D	6	8.0
Pier 26-28	Dredging	Bucket dredge	1	1300	D	1	8.0
		Mobil Crane	1	300	D	12	5.0
Pier 27-29	Installation of floating docks/piles	Vibratory Pile Driver	1	100	D	5	8.0
		Mobil Crane	1	300	D	11	5.0
Pier 27-29	Installation of mooring anchorings	Vibratory Pile Driver	1	100	D	5	8.0
Pier 27-29	Removal of floating docks/piles	Mobil Cranes	1	300	D	6	8.0
Pier 27-29	Removal of mooring anchorings	Mobil Cranes	1	300	D	5	8.0
	Installation of floating docks/wave	Mobil Crane	1	300	D	17	5.0
Pier 30-32	attenuators/piles	Vibratory Pile Driver	1	100	D	7	8.0
Pier 30-32	Removal of floating docks/wave attenuators/piles	Mobil Cranes	1	300	D	9	8.0
		Portable generators	2	80	D	44	5.0
Pier 30-32	Pile Driving	Welding machines	2	40	D	44	5.0
		Boomlift	1	83	D	60	10
		5k Warehouse lift	8	41	D	60	10
		10k Reach forklift	4	99	D	60	10
Pier 30-32	Installation of team base	Event 4000w Light Tower	4	12	D	60	10
		Boomlift	1	83	D	21	10
		5k Warehouse lift	8	41	D	21	10
		10k Reach forklift	4	99	D	21	10
Pier 30-32	Removal of team base	Event 4000w Light Tower	4	12	D	21	10
		Mobil Crane	1	300	D	4	5.0
Pier 32-36	Installation of wave attenuators/piles	Vibratory Pile Driver	1	100	D	2	8.0
		Mobil Crane	1	300	D	3	5.0
Pier 32-36	Installation of mooring anchorings	Vibratory Pile Driver	1	100	D	1	8.0
Pier 32-36	Removal of wave attenuators/piles	Mobil Cranes	1	300	D	2	8.0
Pier 32-36	Removal of mooring anchorings	Mobil Cranes	1	300	D	1	8.0
Pier 32-36	Dredging	Bucket dredge	1	1300	D	30	8.0
Pier 41-45 Water		Mobil Crane	1	300	D	2	5.0
Basin	Installation of floating docks/piles	Vibratory Pile Driver	1	100	D	1	8.0
Pier 41-45 Water Basin	Removal of floating docks/piles	Mobil Cranes	1	300	D	1	8.0
Pier 48 South/		Mobil Crane	1	300	D	2	5.0
China Basin	Installation of floating docks/piles	Vibratory Pile Driver	1	100	D	1	8.0
Pier 48 South/ China Basin	Removal of floating docks/piles	Mobil Cranes	1	300	D	1	8.0

CONSTRUCTION EQUIPMENT

		Boomlift	1	83	D	21	10
		5k Warehouse lift	8	41	D	21	10
		10k Reach forklift	4	99	D	21	10
Pier 80	Removal of team base	Event 4000w Light Tower	4	12	D	21	10
Pier 80	Removal of floating docks/piles	Mobil Cranes	1	300	D	1	8.0
		Mobil Crane	1	300	D	4	5.0
Fort Mason	Installation of floating docks/piles	Vibratory Pile Driver	1	100	D	2	8.0
Fort Mason	Removal of Piles to Support Communication Barge	Mobil Cranes	1	300	D	2	8.0
Fort Mason	Removal of floating docks/piles	Mobil Cranes	1	300	D	2	8.0

ON-ROAD TRUCKS

2012 AC34 Trucks Activity Data Summary

Location	Activity/Components	Category	Truck Type (LT/MD/HVY)	Fuel type	Total one-way trips per day	Duration (days)	Total Idling hours per day	Operating hours per day (hr/day/truck)	On-site distance per one-way trip (mi/one-way trip)	Off-site distance per one-way trip (mi/one-way trip)	On-site speed (mph)	Off-site speed (mph)
		Dump trucks	HHD	D	4	5	0.7	8.0	0.25	20	5	45
		pickups	LDT2	G	12	5	2.0	4.0	0.25	20	5	45
Pier 30-32	Demolition of bldg	Flatbed Truck	HHD	D	5	2	0.8	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	5	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	5	0.3	5.0	0.25	20	5	42
Pier 80	Installation of floating docks/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	2	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	2	0.3	6.0	0.25	20	5	42
Pier 80	Removal of floating docks/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		6' Gas Flatbed	LDT2	G	8	60	1.3	5.0	0.25	20	5	45
		26' Bobtail Truck	HHD	D	8	60	1.3	5.0	0.25	20	5	45
Pier 80	Installation of team base	Flatbed Truck (HDT)	HHD	D	23	2	3.8	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	3	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	3	0.3	5.0	0.25	20	5	42
AC Village	Installation of floating docks/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	3	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	3	0.3	6.0	0.25	20	5	42
AC Village	Removal of floating docks/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
Fort Mason	Installation of Piles to Support Communication Barge	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45

2013 AC34 Trucks Activity Data Summary

Location	Activity/Components	Category	Truck Type (LT/MD/HVY)	Fuel type	Total one-way trips per day	Duration (days)	Total Idling hours per day	Operating hours per day (hr/day/truck)	On-site distance per one-way trip (mi/one-way trip)	Off-site distance per one-way trip (mi/one-way trip)	On-site speed (mph)	Off-site speed (mph)
		Pickup Trucks	LDT2	G	12	2	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	2	0.3	5.0	0.25	20	5	42
Pier 1	Installation of floating docks/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	1	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	1	0.3	6.0	0.25	20	5	42
Pier 1	Removal of floating docks/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	2	2.0	5.0	0.25	20	5	45
Pier 9-15 Water		Flatbed Truck	MHD	D	2	2	0.3	5.0	0.25	20	5	42
Basin	Installation of floating docks/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	1	2.0	5.0	0.25	20	5	45
Pier 9-15 Water		Flatbed Truck	MHD	D	2	1	0.3	6.0	0.25	20	5	42
Basin	Removal of floating docks/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	2	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	2	0.3	5.0	0.25	20	5	42
Pier 17-19	Installation of floating docks/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	1	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	1	0.3	6.0	0.25	20	5	42
Pier 17-19	Removal of floating docks/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45

ON-ROAD TRUCKS

		Pickup Trucks	LDT2	G	12	8	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	8	0.3	5.0	0.25	20	5	42
Pier 23	Installation of floating docks/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
Pier 23	Installation of Piles to Support Communication Barge	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	4	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	4	0.3	6.0	0.25	20	5	42
Pier 23	Removal of floating docks/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	2	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	2	0.3	6.0	0.25	20	5	42
Pier 23	Removal of Piles to Support Communication Barge	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	12	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	12	0.3	5.0	0.25	20	5	42
Pier 26-28	Installation of floating docks/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	6	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	6	0.3	6.0	0.25	20	5	42
Pier 26-28	Removal of floating docks/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		pickups	LDT2	G	12	1	2.0	2.0	0.25	20	5	45
Pier 26-28	Dredging (Pier 32-36)	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	12	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	12	0.3	5.0	0.25	20	5	42
Pier 27-29	Installation of floating docks/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
Pier 27-29	Installation of mooring anchorings	Flatbed Truck	HHD	D	4	2	0.7	6.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	6	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	6	0.3	6.0	0.25	20	5	42
Pier 27-29	Removal of floating docks/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	5	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	5	0.3	6.0	0.25	20	5	42
Pier 27-29	Removal of mooring anchorings	Flatbed Truck	HHD	D	1	5	0.2	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	17	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	17	0.3	5.0	0.25	20	5	42
Pier 30-32	Installation of floating docks/wave attenuators/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	9	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	9	0.3	6.0	0.25	20	5	42
Pier 30-32	Removal of floating docks/wave attenuators/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		pickups	LDT2	G	12	44	2.0	4.0	0.25	20	5	45
Pier 30-32	Pile Driving	Flatbed Truck	HHD	D	4	2	0.7	5.0	0.25	20	5	45
		6' Gas Flatbed	LDT2	G	8	60	1.3	5.0	0.25	20	5	45
		26' Bobtail Truck	HHD	D	8	60	1.3	5.0	0.25	20	5	45
Pier 30-32	Installation of team base	Flatbed Truck	HHD	D	23	2	3.8	5.0	0.25	20	5	45
		6' Gas Flatbed	LDT2	G	8	21	1.3	5.0	0.25	20	5	45
		26' Bobtail Truck	HHD	D	8	21	1.3	5.0	0.25	20	5	45
Pier 30-32	Removal of team base	Flatbed Truck	HHD	D	23	2	3.8	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	4	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	4	0.3	5.0	0.25	20	5	42
Pier 32-36	Installation of wave attenuators/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
Pier 32-36	Installation of mooring anchorings	Flatbed Truck	HHD	D	4	2	0.7	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	2	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	2	0.3	6.0	0.25	20	5	42
Pier 32-36	Removal of wave attenuators/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45

ON-ROAD TRUCKS

		Pickup Trucks	LDT2	G	12	1	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	1	0.3	6.0	0.25	20	5	42
Pier 32-36	Removal of mooring anchorings	Flatbed Truck	HHD	D	1	1	0.2	5.0	0.25	20	5	45
		pickups	LDT2	G	12	30	2.0	2.0	0.25	20	5	45
Pier 32-36	Dredging	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	2	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	2	0.3	5.0	0.25	20	5	42
Pier 41-45 Water Basin	Installation of floating docks/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	1	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	1	0.3	6.0	0.25	20	5	42
Pier 41-45 Water Basin	Removal of floating docks/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	2	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	2	0.3	5.0	0.25	20	5	42
Pier 48 South/ China Basin	Installation of floating docks/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	1	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	1	0.3	6.0	0.25	20	5	42
Pier 48 South/ China Basin	Removal of floating docks/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	1	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	1	0.3	6.0	0.25	20	5	42
Pier 80	Removal of floating docks/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		6' Gas Flatbed	LDT2	G	8	21	1.3	5.0	0.25	20	5	45
		26' Bobtail Truck	HHD	D	8	21	1.3	5.0	0.25	20	5	45
Pier 80	Removal of team base	Flatbed Truck	HHD	D	23	2	3.8	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	4	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	4	0.3	5.0	0.25	20	5	42
Fort Mason	Installation of floating docks/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	2	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	2	0.3	6.0	0.25	20	5	42
Fort Mason	Removal of Piles to Support Communication Barge	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	2	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	2	0.3	6.0	0.25	20	5	42
Fort Mason	Removal of floating docks/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45

WATER SOURCES

2012 AC34 Water Sources Activity Data Summary

Location	Activity/Components	Type	Equipment Count	HP	LF	Fuel Type	Duration (days)	Operating hours per day per boat
		Tug Boat - Main	1	1500	0.5	D	4	2.0
		Tug Boat - Aux	1	111	0.3	D	4	2.0
		Tug Boat - Main	1	1500	0.5	D	4	5.0
Pier 80	Installation of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	4	5.0
		Tug Boat - Main	1	1500	0.5	D	2	5.0
Pier 80	Removal of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	2	5.0
		Tug Boat - Main	1	1500	0.5	D	3	2.0
		Tug Boat - Aux	1	111	0.3	D	3	2.0
		Tug Boat - Main	1	1500	0.5	D	3	5.0
AC Village	Installation of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	3	5.0
		Tug Boat - Main	1	1500	0.5	D	3	5.0
AC Village	Removal of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	3	5.0
	Installation of Piles to Support	Tug Boat - Main	1	1500	0.5	D	4	2.0
Fort Mason	Communication Barge	Tug Boat - Aux	1	111	0.3	D	4	2.0

2013 AC34 Water Sources Activity Data Summary

Year	Activity/Components	Equipment Type	Equipment Count	HP	LF	Fuel Type	Duration (days)	Operating hours per day per boat
		Tug Boat - Main	1	1500	0.5	D	2	2.0
		Tug Boat - Aux	1	111	0.3	D	2	2.0
		Tug Boat - Main	1	1500	0.5	D	2	5.0
Pier 1	Installation of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	2	5.0
		Tug Boat - Main	1	1500	0.5	D	1	5.0
Pier 1	Removal of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	1	5.0
		Tug Boat - Main	1	1500	0.5	D	2	2.0
		Tug Boat - Aux	1	111	0.3	D	2	2.0
Pier 9-15 Water		Tug Boat - Main	1	1500	0.5	D	2	5.0
Basin	Installation of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	2	5.0
Pier 9-15 Water		Tug Boat - Main	1	1500	0.5	D	1	5.0
Basin	Removal of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	1	5.0
		Tug Boat - Main	1	1500	0.5	D	2	2.0
		Tug Boat - Aux	1	111	0.3	D	2	2.0
		Tug Boat - Main	1	1500	0.5	D	2	5.0
Pier 17-19	Installation of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	2	5.0
		Tug Boat - Main	1	1500	0.5	D	1	5.0
Pier 17-19	Removal of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	1	5.0

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		Tug Boat - Main	1	1500	0.5	D	6	2.0
		Tug Boat - Aux	1	111	0.3	D	6	2.0
		Tug Boat - Main	1	1500	0.5	D	6	5.0
Pier 23	Installation of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	6	5.0
	Installation of Piles to Support	Tug Boat - Main	1	1500	0.5	D	4	2.0
Pier 23	Communication Barge	Tug Boat - Aux	1	111	0.3	D	4	2.0
		Tug Boat - Main	1	1500	0.5	D	4	5.0
Pier 23	Removal of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	4	5.0
	Removal of Piles to Support Communication	Tug Boat - Main	1	1500	0.5	D	2	5.0
Pier 23	Barge	Tug Boat - Aux	1	111	0.3	D	2	5.0
		Tug Boat - Main	1	1500	0.5	D	10	2.0
		Tug Boat - Aux	1	111	0.3	D	10	2.0
		Tug Boat - Main	1	1500	0.5	D	10	5.0
Pier 26-28	Installation of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	10	5.0
		Tug Boat - Main	1	1500	0.5	D	6	5.0
Pier 26-28	Removal of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	6	5.0
		Bottom dump skows - Main	3	275	0.5	D	1	2.0
		Bottom dump skows - Aux	3	111	0.3	D	1	2.0
		Tugs (ocean going) - Main	1	2500	0.3	D	1	2.0
		Tugs (ocean going) - Aux	1	110	0.4	D	1	2.0
		Tugs (ocean going) - Main	1	2500	0.3	D	1	6.0
		Tugs (ocean going) - Aux	1	110	0.4	D	1	6.0
		Service boat - Main	1	500	0.5	D	1	3.0
Pier 26-28	Dredging	Service boat - Aux	1	111	0.3	D	1	3.0
		Tug Boat - Main	1	1500	0.5	D	10	2.0
		Tug Boat - Aux	1	111	0.3	D	10	2.0
		Tug Boat - Main	1	1500	0.5	D	10	5.0
Pier 27-29	Installation of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	10	5.0
		Tug Boat - Main	1	1500	0.5	D	9	2.0
Pier 27-29	Installation of mooring anchorings	Tug Boat - Aux	1	111	0.3	D	9	2.0
		Tug Boat - Main	1	1500	0.5	D	6	5.0
Pier 27-29	Removal of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	6	5.0
		Tug Boat - Main	1	1500	0.5	D	5	5.0
Pier 27-29	Removal of mooring anchorings	Tug Boat - Aux	1	111	0.3	D	5	5.0
		Tug Boat - Main	1	1500	0.5	D	14	2.0
		Tug Boat - Aux	1	111	0.3	D	14	2.0
	Installation of floating docks/wave	Tug Boat - Main	1	1500	0.5	D	14	5.0
Pier 30-32	attenuators/piles	Tug Boat - Aux	1	111	0.3	D	14	5.0
	Removal of floating docks/wave	Tug Boat - Main	1	1500	0.5	D	9	5.0
Pier 30-32	attenuators/piles	Tug Boat - Aux	1	111	0.3	D	9	5.0

WATER SOURCES

		Support tug - Main	1	1500	0.5	D	30	5.0
		Support tug - Aux	1	111	0.3	D	30	5.0
		Service boat - Main	1	1500	0.5	D	44	3.0
Pier 30-32	Pile Driving	Service boat - Aux	1	111	0.3	D	44	3.0
		Tug Boat - Main	1	1500	0.5	D	4	2.0
		Tug Boat - Aux	1	111	0.3	D	4	2.0
		Tug Boat - Main	1	1500	0.5	D	3	5.0
Pier 32-36	Installation of wave attenuators/piles	Tug Boat - Aux	1	111	0.3	D	3	5.0
		Tug Boat - Main	1	1500	0.5	D	2	2.0
Pier 32-36	Installation of mooring anchorings	Tug Boat - Aux	1	111	0.3	D	2	2.0
		Tug Boat - Main	1	1500	0.5	D	2	5.0
Pier 32-36	Removal of wave attenuators/piles	Tug Boat - Aux	1	111	0.3	D	2	5.0
		Tug Boat - Main	1	1500	0.5	D	1	5.0
Pier 32-36	Removal of mooring anchorings	Tug Boat - Aux	1	111	0.3	D	1	5.0
		Bottom dump skows - Main	3	275	0.5	D	30	2.0
		Bottom dump skows - Aux	3	111	0.3	D	30	2.0
		Tugs (ocean going) - Main	1	2500	0.3	D	30	2.0
		Tugs (ocean going) - Aux	1	110	0.4	D	30	2.0
		Tugs (ocean going) - Main	1	2500	0.3	D	30	6.0
		Tugs (ocean going) - Aux	1	110	0.4	D	30	6.0
		Service boat - Main	1	500	0.5	D	30	3.0
Pier 32-36	Dredging	Service boat - Aux	1	111	0.3	D	30	3.0
Pier 41-45 Water		Tug Boat - Main	1	1500	0.5	D	1	5.0
Basin	Removal of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	1	5.0
Pier 48 South/		Tug Boat - Main	1	1500	0.5	D	1	5.0
China Basin	Removal of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	1	5.0
		Tug Boat - Main	1	1500	0.5	D	1	5.0
Pier 80	Removal of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	1	5.0
		Tug Boat - Main	1	1500	0.5	D	2	2.0
		Tug Boat - Aux	1	111	0.3	D	2	2.0
Pier 41-45 Water		Tug Boat - Main	1	1500	0.5	D	2	5.0
Basin	Installation of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	2	5.0
		Tug Boat - Main	1	1500	0.5	D	2	2.0
		Tug Boat - Aux	1	111	0.3	D	2	2.0
Pier 48 South/		Tug Boat - Main	1	1500	0.5	D	2	5.0
China Basin	Installation of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	2	5.0
		Tug Boat - Main	1	1500	0.5	D	3	2.0
		Tug Boat - Aux	1	111	0.3	D	3	2.0
		Tug Boat - Main	1	1500	0.5	D	3	5.0
Fort Mason	Installation of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	3	5.0

WATER SOURCES

Fort Mason	Removal of Piles to Support Communication Barge	Tug Boat - Main	1	1500	0.5	D	2	5.0
		Tug Boat - Aux	1	111	0.3	D	2	5.0
Fort Mason	Removal of floating docks/piles	Tug Boat - Main	1	1500	0.5	D	2	5.0
		Tug Boat - Aux	1	111	0.3	D	2	5.0

CONSTRUCTION EQUIPMENT

2012 AC34 Construction Equipment Emissions Factors

Equipment Type	HP	Fuel Type	Emissions Factors (g/bhp-hr)									
			ROG	CO	NOX	SO2	PM	DPM	PM2.5	CH4	N2O	CO2
Hoe-ram	180	D	0.49	1.24	4.24	0.01	0.14	0.14	0.13	0.04	0.00	568.30
Backhoe /loader	180	D	0.49	1.24	4.24	0.01	0.14	0.14	0.13	0.04	0.00	568.30
Portable generators & jack hammers	80	D	1.24	4.10	6.22	0.01	0.59	0.59	0.54	0.10	0.00	568.30
Mobil Crane	300	D	0.61	1.80	4.84	0.01	0.18	0.18	0.17	0.05	0.00	568.30
Vibratory Pile Driver	100	D	1.31	4.14	6.62	0.01	0.60	0.60	0.56	0.10	0.00	568.30
Boomlift	83	D	1.31	4.14	6.62	0.01	0.60	0.60	0.56	0.10	0.00	568.30
5k Warehouse lift	41	D	2.31	6.48	5.75	0.01	0.52	0.52	0.48	0.18	0.00	568.30
10k Reach forklift	99	D	1.04	3.99	5.45	0.01	0.50	0.50	0.46	0.08	0.00	568.30
Event 4000w Light Tower	12	D	1.02	3.87	5.87	0.01	0.34	0.34	0.31	0.08	0.00	568.30

Note: Construction equipment emission factors were calculated from OFFROAD2007.

2013 AC34 Construction Equipment Emissions Factors

Equipment Type	HP	Fuel Type	Emissions Factors (g/bhp-hr)									
			ROG	CO	NOX	SO2	PM	DPM	PM2.5	CH4	N2O	CO2
Mobil Crane	300	D	0.58	1.67	4.49	0.01	0.16	0.16	0.15	0.04	0.00	568.30
Vibratory Pile Driver	100	D	1.22	4.10	6.24	0.01	0.56	0.56	0.51	0.09	0.00	568.30
Bucket dredge	1300	D	0.49	1.39	4.43	0.01	0.15	0.15	0.14	0.04	0.00	568.30
Portable generators	80	D	0.93	3.57	5.48	0.01	0.42	0.42	0.39	0.07	0.00	568.30
Welding machines	40	D	2.47	5.97	5.53	0.01	0.52	0.52	0.48	0.19	0.00	568.30
Boomlift	83	D	1.22	4.10	6.24	0.01	0.56	0.56	0.51	0.09	0.00	568.30
5k Warehouse lift	41	D	2.00	6.25	5.53	0.01	0.46	0.46	0.43	0.15	0.00	568.30
10k Reach forklift	99	D	0.93	3.95	5.04	0.01	0.43	0.43	0.40	0.07	0.00	568.30
Event 4000w Light Tower	12	D	0.97	3.80	5.62	0.01	0.32	0.32	0.29	0.07	0.00	568.30

Note: Construction equipment emission factors were calculated from OFFROAD2007.

TRUCKS

2012 AC34 Trucks Emissions Factors - Idling

Category	Truck Type (LT/MD/HVY)	Fuel type	Idling Emissions Factors (g/hr)											
			D-ROGexh	G-ROGexh	G-ROGevp	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Dump trucks	HHD	D	11.46	0.00	0.00	49.27	112.64	0.06	1.50	1.50	1.38	0.00	0.00	6541.72
Flatbed Truck	HHD	D	11.46	0.00	0.00	49.27	112.64	0.06	1.50	1.50	1.38	0.00	0.00	6541.72
Pickup Trucks	LDT2	G	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Flatbed Truck	MHD	D	3.17	0.00	0.00	26.30	75.05	0.04	0.93	0.93	0.86	0.00	0.00	4098.00
6' Gas Flatbed	LDT2	G	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26' Bobtail Truck	HHD	D	11.46	0.00	0.00	49.27	112.64	0.06	1.50	1.50	1.38	0.00	0.00	6541.72

2012 AC34 Trucks Emissions Factors - On-site Moving at 5 mph

Category	Truck Type (LT/MD/HVY)	Fuel type	On-Site Moving Emissions Factors (g/mi)											
			D-ROGexh	G-ROGexh	G-ROGevp	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Dump trucks	HHD	D	8.61	0.00	0.00	14.10	30.55	0.04	1.76	1.76	1.62	0.01	0.01	3845.36
Flatbed Truck	HHD	D	8.61	0.00	0.00	14.10	30.55	0.04	1.76	1.76	1.62	0.01	0.01	3845.36
Pickup Trucks	LDT2	G	0.00	0.37	0.51	5.15	0.58	0.01	0.12	0.00	0.11	0.00	0.01	1189.04
Flatbed Truck	MHD	D	0.53	0.00	0.00	6.79	10.40	0.01	0.63	0.63	0.58	0.00	0.01	1505.00
6' Gas Flatbed	LDT2	G	0.00	0.37	0.51	5.15	0.58	0.01	0.12	0.00	0.11	0.00	0.01	1189.04
26' Bobtail Truck	HHD	D	8.61	0.00	0.00	14.10	30.55	0.04	1.76	1.76	1.62	0.01	0.01	3845.36

2012 AC34 Trucks Emissions Factors - Off-site Moving at Composite Speed

Category	Truck Type (LT/MD/HVY)	Fuel type	Off-Site Moving Emissions Factors (g/mi)											
			D-ROGexh	G-ROGexh	G-ROGevp	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Dump trucks	HHD	D	0.74	0.00	0.00	3.12	11.62	0.02	0.44	0.44	0.40	0.01	0.01	1778.49
Flatbed Truck	HHD	D	0.74	0.00	0.00	3.12	11.62	0.02	0.44	0.44	0.40	0.01	0.01	1778.49
Pickup Trucks	LDT2	G	0.00	0.08	0.05	2.65	0.36	0.00	0.02	0.00	0.02	0.00	0.00	464.39
Flatbed Truck	MHD	D	0.15	0.00	0.00	1.49	7.09	0.01	0.18	0.18	0.16	0.00	0.00	1379.58
6' Gas Flatbed	LDT2	G	0.00	0.08	0.05	2.65	0.36	0.00	0.02	0.00	0.02	0.00	0.00	464.39
26' Bobtail Truck	HHD	D	0.74	0.00	0.00	3.12	11.62	0.02	0.44	0.44	0.40	0.01	0.01	1778.49

Note: Trucks emission factors from EMFAC2007

2013 AC34 Trucks Emissions Factors - Idling

Category	Truck Type (LT/MD/HVY)	Fuel type	Idling Emissions Factors (g/hr)											
			D-ROGexh	G-ROGexh	G-ROGevp	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Pickup Trucks	LDT2	G	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Flatbed Truck	MHD	D	3.17	0.00	0.00	26.30	75.05	0.04	0.92	0.92	0.84	0.00	0.00	4098.00
Flatbed Truck	HHD	D	10.96	0.00	0.00	48.55	113.98	0.06	1.35	1.35	1.24	0.00	0.00	6541.71
6' Gas Flatbed	LDT2	G	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26' Bobtail Truck	HHD	D	10.96	0.00	0.00	48.55	113.98	0.06	1.35	1.35	1.24	0.00	0.00	6541.71

2012 AC34 Trucks Emissions Factors - On-site Moving at 5 mph

Category	Truck Type (LT/MD/HVY)	Fuel type	On-Site Moving Emissions Factors (g/mi)											
			D-ROGexh	G-ROGexh	G-ROGevp	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Pickup Trucks	LDT2	G	0.00	0.28	0.47	4.12	0.52	0.01	0.12	0.00	0.11	0.00	0.01	1188.65
Flatbed Truck	MHD	D	0.51	0.00	0.00	6.56	9.37	0.01	0.60	0.60	0.55	0.00	0.01	1505.00

TRUCKS

Flatbed Truck	HHD	D	7.81	0.00	0.00	12.93	27.24	0.04	1.50	1.50	1.38	0.01	0.01	3845.36
6' Gas Flatbed	LDT2	G	0.00	0.28	0.47	4.12	0.52	0.01	0.12	0.00	0.11	0.00	0.01	1188.65
26' Bobtail Truck	HHD	D	7.81	0.00	0.00	12.93	27.24	0.04	1.50	1.50	1.38	0.01	0.01	3845.36

2013 AC34 Trucks Emissions Factors - Off-site Moving at Composite Speed

Category	Truck Type (LT/MD/HVY)	Fuel type	Off-Site Moving Emissions Factors (g/mi)											
			D-ROGexh	G-ROGexh	G-ROGevp	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Pickup Trucks	LDT2	G	0.00	0.05	0.04	2.14	0.31	0.00	0.03	0.00	0.02	0.00	0.00	464.24
Flatbed Truck	MHD	D	0.14	0.00	0.00	1.44	6.38	0.01	0.17	0.17	0.16	0.00	0.00	1379.58
Flatbed Truck	HHD	D	0.67	0.00	0.00	2.87	10.27	0.02	0.39	0.39	0.36	0.01	0.01	1778.49
6' Gas Flatbed	LDT2	G	0.00	0.05	0.04	2.14	0.31	0.00	0.03	0.00	0.02	0.00	0.00	464.24
26' Bobtail Truck	HHD	D	0.67	0.00	0.00	2.87	10.27	0.02	0.39	0.39	0.36	0.01	0.01	1778.49

Note: Trucks emission factors from EMFAC2007

WATER SOURCES

Type of Vessels	Engine	Fuel type	LF	HP	Emission Factors (g/bhp-hr)						
					ROG	CO	NOX	SO2	PM	DPM	PM2.5
Tug Boat	Main	D	0.5	1500	1.24	3.72	14.22	184.00	0.59	0.59	0.57
	Auxiliary	D	0.31	111	2.10	5.59	13.47	184.00	0.72	0.72	0.70
Assist tug	Main	D	0.5	1500	1.24	3.72	14.22	184.00	0.59	0.59	0.57
	Auxiliary	D	0.31	111	2.10	5.59	13.47	184.00	0.72	0.72	0.70
Bottom dump skows	Main	D	0.5	275	1.24	3.72	14.22	184.00	0.59	0.59	0.57
	Auxiliary	D	0.31	111	2.10	5.59	13.47	184.00	0.72	0.72	0.70
Tugs (ocean going)	Main	D	0.31	2500	0.72	2.79	2.79	184.00	0.48	0.48	0.47
	Auxiliary	D	0.43	110	0.98	3.25	3.25	184.00	0.67	0.67	0.65
Service boat	Main	D	0.50	1500	1.24	3.72	14.22	184.00	0.59	0.59	0.57
	Auxiliary	D	0.31	111	2.10	5.59	13.47	184.00	0.72	0.72	0.70

Note: Water sources emission factors from SF Bay Seaport Air Emissions Inventory; POSF 2005 Emissions Inventory

CONSTRUCTION EQUIPMENT

2012 AC34 Construction Equipment Emissions Summary

Location	Total Annual Emissions (tpy)									
	ROG	CO	NOX	SO2	PM	DPM	PM2.5	CH4	N2O	CO2
Pier 80	0.19	0.63	0.76	0.00	0.07	0.07	0.06	0.01	0.00	75.14
Marina Green	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	2.40
Fort Mason	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.64
Pier 32-36, 30-32, 26-28	0.01	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	5.05
Pier 23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 17-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 41-45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aquatic Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total 2012 Annual	**0.21**	**0.66**	**0.84**	**0.00**	**0.07**	**0.07**	**0.06**	**0.02**	**0.00**	**84.23**

2013 AC34 Construction Equipment Emissions Summary

Location	Total Annual Emissions (tpy)									
	ROG	CO	NOX	SO2	PM	DPM	PM2.5	CH4	N2O	CO2
Pier 27-29	0.01	0.04	0.10	0.00	0.00	0.00	0.00	0.00	0.00	12.43
Pier 80	0.06	0.21	0.25	0.00	0.02	0.02	0.02	0.00	0.00	25.85
Marina Green	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fort Mason	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	3.10
Pier 32-36, 30-32, 26-28	0.35	1.16	1.77	0.00	0.11	0.11	0.10	0.03	0.00	201.03
Pier 23	0.01	0.02	0.06	0.00	0.00	0.00	0.00	0.00	0.00	6.84
Pier 48	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.12
Pier 1	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.12
Pier 9-15	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.12
Pier 17-19	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.12
Pier 41-45	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.12
Aquatic Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46
Total 2013 Annual	**0.44**	**1.47**	**2.25**	**0.00**	**0.14**	**0.14**	**0.13**	**0.03**	**0.00**	**255.32**

TRUCKS

2012 AC34 Truck Emissions Summary

Location	Total Annual Emissions (tpy)											
	D-ROGexh	G-ROGexh	G-ROGevap	CO	NOX	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Pier 80	0.01	0.00	0.00	0.08	0.16	0.00	0.01	0.01	0.01	0.00	0.00	28.46
Marina Green	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.39
Fort Mason	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17
Pier 32-36, 30-32, 26-28	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.88
Pier 23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 17-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 41-45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aquatic Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total 2012 Annual	**0.01**	**0.00**	**0.00**	**0.09**	**0.17**	**0.00**	**0.01**	**0.01**	**0.01**	**0.00**	**0.00**	**31.90**

Note: Truck emissions include both on-site and off-site emissions.

2013 AC34 Truck Emissions Summary

Location	Total Annual Emissions (tpy)											
	D-ROGexh	G-ROGexh	G-ROGevap	CO	NOX	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Pier 27-29	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	5.16
Pier 80	0.00	0.00	0.00	0.03	0.06	0.00	0.00	0.00	0.00	0.00	0.00	10.92
Marina Green	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fort Mason	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.85
Pier 32-36, 30-32, 26-28	0.02	0.00	0.00	0.17	0.23	0.00	0.01	0.01	0.01	0.00	0.00	58.34
Pier 23	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	3.16
Pier 48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82
Pier 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82
Pier 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82
Pier 17-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82
Pier 41-45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82
Aquatic Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Total 2013 Annual	**0.0**	**0.0**	**0.0**	**0.2**	**0.3**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**83.5**

Note: Truck emissions include both on-site and off-site emissions.

WATER SOURCES

2012 AC34 Water Source Emissions Summary

Location	Total Annual Emissions (tpy)						
	ROG	CO	NOX	SO2	PM	DPM	PM2.5
Pier 80	0.04	0.12	0.47	0.00	0.02	0.02	0.02
Marina Green	0.04	0.12	0.44	0.00	0.02	0.02	0.02
Fort Mason	0.01	0.03	0.10	0.00	0.00	0.00	0.00
Pier 32-36, 30-32, 26-28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 17-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 41-45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aquatic Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total 2012 Annual	**0.09**	**0.27**	**1.01**	**0.00**	**0.04**	**0.04**	**0.04**

2013 AC34 Water Source Emissions Summary

Location	Total Annual Emissions (tpy)						
	ROG	CO	NOX	SO2	PM	DPM	PM2.5
Pier 27-29	0.16	0.47	1.75	0.00	0.07	0.07	0.07
Pier 80	0.01	0.02	0.06	0.00	0.00	0.00	0.00
Marina Green	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fort Mason	0.05	0.13	0.50	0.00	0.02	0.02	0.02
Pier 32-36, 30-32, 26-28	0.88	2.76	8.50	0.00	0.44	0.44	0.43
Pier 23	0.09	0.26	0.98	0.00	0.04	0.04	0.04
Pier 48	0.02	0.06	0.23	0.00	0.01	0.01	0.01
Pier 1	0.02	0.06	0.23	0.00	0.01	0.01	0.01
Pier 9-15	0.02	0.06	0.23	0.00	0.01	0.01	0.01
Pier 17-19	0.02	0.06	0.23	0.00	0.01	0.01	0.01
Pier 41-45	0.02	0.06	0.23	0.00	0.01	0.01	0.01
Aquatic Park	0.00	0.01	0.04	0.00	0.00	0.00	0.00
Total 2013 Annual	**1.3**	**4.0**	**13.0**	**0.0**	**0.6**	**0.6**	**0.6**

CONSTRUCTION EQUIPMENT

2012 Cruise Terminal Construction Equipment Data Summary

Location	Activity/Components	Equipment Type	Equipment Count	HP	Fuel Type	Duration (days)	Operating Hours per Day
		Truck cranes	2	350	D	20	8.0
		Hydraulic crane	1	160	D	20	8.0
		980 Loader	1	318	D	20	6.0
Pier 27-29	Demolition of bldg	Backhoe-loader	1	180	D	20	6.0
		Pump	2	53	D	60	8.0
		Cranes	1	300	D	60	5.0
Pier 27-29	Paving/ Concrete Improvement	Paver system (AC)	1	250	D	60	8.0
		Land crane	3	399	D	365	4.0
		Backhoe/ Loader	2	108	D	365	8.0
		Generator	4	49	D	365	8.0
		Compressor	10	106	D	365	8.0
		Forklift	8	83	D	365	8.0
Pier 27-29	New building construction	Welding machine	8	40	D	60	5.0

ON-ROAD TRUCKS

2012 Cruise Terminal Truck Activity Data Summary

Location	Activity/Components	Category	Truck Type (LT/MD/HVY)	Fuel type	Total one-way trips per day	Duration (days)	Total Idling hours per day	Operating hours per day (hr/day/truck)	Total distance per day (mi/day)	On-site distance per one-way trip (mi/one-way trip)	Off-site distance per one-way trip (mi/one-way trip)	On-site speed (mph)	Off-site speed (mph)
		pickups	LDT2	G	18	20	3.0	4.0	4.5	0.25	20	5	45
		Fleet of bathtub dumps	HHD	D	2	20	0.3	10.0	0.5	0.25	20	5	45
		Water truck	HHD	D	1	20	0.2	2.0	0.3	0.25	20	5	45
Pier 27-29	Demolition of bldg	Flatbed Truck	HHD	D	5	2	0.8	5.0	1.3	0.25	20	5	45
		Concrete truck	HHD	D	4	60	0.7	5.0	1.0	0.25	20	5	45
		Pickups	LDT2	D	8	60	1.3	4.0	2.0	0.25	20	5	45
		Flatbed trucks	HHD	D	4	60	0.7	5.0	1.0	0.25	20	5	45
		Dump trucks	HHD	D	4	60	0.7	8.0	1.0	0.25	20	5	45
Pier 27-29	Paving/ Concrete Improvement	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.5	0.25	20	5	45
Pier 27-29	Pile driving	Pickups	LDT2	G	8	30	1.3	4.0	2.0	0.25	20	5	45
		Flatbed trucks	HHD	D	8	365	1.3	5.0	2.0	0.25	20	5	45
		Dump trucks	HHD	D	4	365	0.7	8.0	1.0	0.25	20	5	45
		Pickups	LDT2	G	48	365	8.0	4.0	12.0	0.25	20	5	45
Pier 27-29	New building construction	Flatbed Truck	HHD	D	43	2	7.2	5.0	10.8	0.25	20	5	45

WATER SOURCES

2012 Cruise Terminal Water Sources Activity Data Summary

Location	Activity/Components	Type	Equipment Count	HP	LF	Fuel Type	Duration (days)	Operating hours per day per boat
Pier 27-29	Pile Driving	Assist tug - Main	1	1500	0.5	D	30	5.0
		Assist tug - Aux	1	111	0.31	D	30	5.0
Pier 27-29	New building construction	Assist tug - Main	1	1500	0.5	D	30	5.0
		Assist tug - Aux	1	111	0.31	D	30	5.0

2013 Cruise Terminal Activity Summary

Assume 90%/10% pre-/post race construction emissions at Pier 27-29*

CONSTRUCTION EQUIPMENT

2012 Cruise Terminal Construction Equipment Emissions Factors

Equipment Type	HP	Fuel Type	Emissions Factors (g/bhp-hr)									
			ROG	CO	NOX	SO2	PM	DPM	PM2.5	CH4	N2O	CO2
Truck cranes	350	D	0.61	1.80	4.84	0.01	0.18	0.18	0.17	0.05	0.00	568.30
Hydraulic crane	160	D	0.91	3.42	5.84	0.01	0.34	0.34	0.31	0.07	0.00	568.30
980 Loader	318	D	0.46	1.27	3.73	0.01	0.13	0.13	0.12	0.04	0.00	568.30
Backhoe-loader	180	D	0.49	1.24	4.24	0.01	0.14	0.14	0.13	0.04	0.00	568.30
Pump	53	D	1.05	3.66	5.94	0.01	0.48	0.48	0.44	0.08	0.00	568.30
Cranes	300	D	0.61	1.80	4.84	0.01	0.18	0.18	0.17	0.05	0.00	568.30
Paver system (AC)	250	D	0.75	1.86	6.05	0.01	0.24	0.24	0.22	0.06	0.00	568.30
Land crane	399	D	0.61	1.80	4.84	0.01	0.18	0.18	0.17	0.05	0.00	568.30
Backhoe/ Loader	108	D	0.98	3.91	5.39	0.01	0.47	0.47	0.44	0.08	0.00	568.30
Generator	49	D	2.05	5.03	5.49	0.01	0.47	0.47	0.43	0.16	0.00	568.30
Compressor	106	D	1.30	4.09	6.51	0.01	0.61	0.61	0.56	0.10	0.00	568.30
Forklift	83	D	1.04	3.99	5.45	0.01	0.50	0.50	0.46	0.08	0.00	568.30
Welding machine	40	D	2.70	6.19	5.75	0.01	0.56	0.56	0.52	0.21	0.00	568.30

TRUCKS

2012 AC34 Trucks Emissions Factors - Idling

Category	Truck Type (LT/MD/HV	Fuel type	Idling Emissions Factors (g/hr)											
			D-ROGexh	G-ROGexh	G-ROGevp	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Fleet of bathtub dumps	HHD	D	11.46	0.00	0.00	49.27	112.64	0.06	1.50	1.50	1.38	0.00	0.00	6541.72
Water truck	HHD	D	11.46	0.00	0.00	49.27	112.64	0.06	1.50	1.50	1.38	0.00	0.00	6541.72
Flatbed Truck	HHD	D	11.46	0.00	0.00	49.27	112.64	0.06	1.50	1.50	1.38	0.00	0.00	6541.72
Concrete truck	HHD	D	11.46	0.00	0.00	49.27	112.64	0.06	1.50	1.50	1.38	0.00	0.00	6541.72
Pickups	LDT2	D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dump trucks	HHD	D	11.46	0.00	0.00	49.27	112.64	0.06	1.50	1.50	1.38	0.00	0.00	6541.72
Pickups	LDT2	G	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2012 AC34 Trucks Emissions Factors - On-site Moving at 5 mph

Category	Truck Type (LT/MD/HV	Fuel type	On-Site Moving Emissions Factors (g/mi)											
			D-ROGexh	G-ROGexh	G-ROGevp	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Fleet of bathtub dumps	HHD	D	8.61	0.00	0.00	14.10	30.55	0.04	1.76	1.76	1.62	0.01	0.01	3845.36
Water truck	HHD	D	8.61	0.00	0.00	14.10	30.55	0.04	1.76	1.76	1.62	0.01	0.01	3845.36
Flatbed Truck	HHD	D	8.61	0.00	0.00	14.10	30.55	0.04	1.76	1.76	1.62	0.01	0.01	3845.36
Concrete truck	HHD	D	8.61	0.00	0.00	14.10	30.55	0.04	1.76	1.76	1.62	0.01	0.01	3845.36
Pickups	LDT2	D	0.27	0.00	0.00	2.52	2.05	0.00	0.21	0.21	0.19	0.00	0.01	350.24
Dump trucks	HHD	D	8.61	0.00	0.00	14.10	30.55	0.04	1.76	1.76	1.62	0.01	0.01	3845.36
Pickups	LDT2	G	0.00	0.37	0.51	5.15	0.58	0.01	0.12	0.00	0.11	0.00	0.01	1189.04

2012 AC34 Trucks Emissions Factors - Off-site Moving at Composite Speed

Category	Truck Type (LT/MD/HV	Fuel type	Off-Site Moving Emissions Factors (g/mi)											
			D-ROGexh	G-ROGexh	G-ROGevp	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Fleet of bathtub dumps	HHD	D	0.74	0.00	0.00	3.12	11.62	0.02	0.44	0.44	0.40	0.01	0.01	1778.49
Water truck	HHD	D	0.74	0.00	0.00	3.12	11.62	0.02	0.44	0.44	0.40	0.01	0.01	1778.49
Flatbed Truck	HHD	D	0.74	0.00	0.00	3.12	11.62	0.02	0.44	0.44	0.40	0.01	0.01	1778.49
Concrete truck	HHD	D	0.74	0.00	0.00	3.12	11.62	0.02	0.44	0.44	0.40	0.01	0.01	1778.49
Pickups	LDT2	D	0.07	0.00	0.00	0.65	1.64	0.00	0.07	0.07	0.06	0.00	0.00	350.24
Dump trucks	HHD	D	0.74	0.00	0.00	3.12	11.62	0.02	0.44	0.44	0.40	0.01	0.01	1778.49
Pickups	LDT2	G	0.00	0.08	0.05	2.65	0.36	0.00	0.02	0.00	0.02	0.00	0.00	464.39

WATER SOURCES

				Adjusted EF (grams / hp-hr)						
Type of Vessels	**Engine**	**LF**	**HP**	**ROG**	**CO**	**NOX**	**SO2**	**PM**	**DPM**	**PM2.5**
Assist tug	Main	0.5	1500	1.24	3.72	14.22	184.00	0.59	0.59	0.57
	Auxiliary	0.31	111	2.10	5.59	13.47	184.00	0.72	0.72	0.70
Tug Boat	Main	0.5	1500	1.24	3.72	14.22	184.00	0.59	0.59	0.57
	Auxiliary	0.31	111	2.10	5.59	13.47	184.00	0.72	0.72	0.70

CONSTRUCTION EQUIPMENT

2012 Cruise Terminal Construction Equipment Emissions Summary

Location	Total Annual Emissions (tpy)									
	ROG	CO	NOX	SO2	PM	DPM	PM2.5	CH4	N2O	CO2
Pier 27-29	3.67	11.47	18.18	0.02	1.48	1.48	1.36	0.28	0.00	1782.40

2013 Post-race Cruise Terminal Construction Equipment Emissions Summary

Location	Total Annual Emissions (tpy)									
	ROG	CO	NOX	SO2	PM	DPM	PM2.5	CH4	N2O	CO2
Pier 27-29	0.41	1.28	2.03	0.00	0.17	0.17	0.15	0.03	0.00	199.43

Note: Assume 90%/10% pre-/post race construction emisssions at Pier 27-29.

TRUCKS

2012 Cruise Terminal Truck Emissions Summary

Location	Total Annual Emissions (tpy)											
	D-ROGexh	G-ROGexh	G-ROGevap	CO	NOX	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Pier 27-29	0.11	0.03	0.03	1.54	1.65	0.00	0.07	0.05	0.06	0.00	0.00	414.55

Note: Truck emissions include both on-site and off-site emissions.

2013 Post-race Cruise Terminal Truck Emissions Summary

Location	Total Annual Emissions (tpy)											
	D-ROGexh	G-ROGexh	G-ROGevap	CO	NOX	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Pier 27-29	0.01	0.00	0.00	0.17	0.19	0.00	0.01	0.01	0.01	0.00	0.00	46.63

Notes:

1) Truck emissions include both on-site and off-site emissions.

2) Assume 90%/10% pre-/post race construction emisssions at Pier 27-29.

WATER SOURCES

2012 Cruise Terminal Water Source Emissions Summary

Location	Total Annual Emissions (tpy)						
	ROG	CO	NOX	SO2	PM	DPM	PM2.5
Pier 27-29	0.33	0.99	3.68	0.00	0.15	0.15	0.15

2013 Cruise Terminal Water Source Emissions Summary

Location	Total Annual Emissions (tpy)						
	ROG	CO	NOX	SO2	PM	DPM	PM2.5
Pier 27-29	0.05	0.16	0.60	0.00	0.03	0.03	0.02

Note: Assume 90%/10% pre-/post race construction emisssions at Pier 27-29.

CONSTRUCTION EQUIPMENT

2012 AC34 Construction Equipment Activity Data Summary

Location	Activity/Components	Equipment Type	Equipment Count	HP	Fuel Type	Duration (days)	Operating Hours per Day
Pier 30-32	Demolition of bldg	Hoe-ram	1	180	D	5	6.0
		Backhoe /loader	2	180	D	5	6.0
		Portable generators & jack hammers	2	80	D	5	5.0
Pier 80	Installation of floating docks/piles	Mobil Crane	1	300	D	5	5.0
		Vibratory Pile Driver	1	100	D	2	8.0
Pier 80	Removal of floating docks/piles	Mobil Cranes	1	300	D	2	8.0
Pier 80	Installation of team base	Boomlift	1	83	D	60	10.0
		5k Warehouse lift	8	41	D	60	10.0
		10k Reach forklift	4	99	D	60	10.0
		Event 4000w Light Tower	4	12	D	60	10.0
AC Village	Installation of floating docks/piles	Mobil Crane	1	300	D	3	5.0
		Vibratory Pile Driver	1	100	D	2	8.0
AC Village	Removal of floating docks/piles	Mobil Cranes	1	300	D	3	8.0
Fort Mason	Installation of Piles to Support Communication Barge	Mobil Crane	1	300	D	5	5.0
		Vibratory Pile Driver	1	100	D	2	8.0

2013 AC34 Construction Equipment Activity Data Summary

Location	Activity/Components	Equipment Type	Equipment Count	HP	Fuel Type	Duration (days)	Operating Hours per Day
Pier 1	Installation of floating docks/piles	Mobil Crane	1	300	D	2	5.0
		Vibratory Pile Driver	1	100	D	1	8.0
Pier 1	Removal of floating docks/piles	Mobil Cranes	1	300	D	1	8.0
Pier 9-15 Water Basin	Installation of floating docks/piles	Mobil Crane	1	300	D	2	5.0
		Vibratory Pile Driver	1	100	D	1	8.0
Pier 9-15 Water Basin	Removal of floating docks/piles	Mobil Cranes	1	300	D	1	8.0
Pier 17-19	Installation of floating docks/piles	Mobil Crane	1	300	D	2	5.0
		Vibratory Pile Driver	1	100	D	1	8.0
Pier 17-19	Removal of floating docks/piles	Mobil Cranes	1	300	D	1	8.0
Pier 23	Installation of floating docks/piles	Mobil Crane	1	300	D	8	5.0
		Vibratory Pile Driver	1	100	D	3	8.0
Pier 23	Installation of Piles to Support Communication Barge	Mobil Crane	1	300	D	5	5.0
		Vibratory Pile Driver	1	100	D	2	8.0
Pier 23	Removal of floating docks/piles	Mobil Cranes	1	300	D	4	8.0
Pier 23	Removal of Piles to Support Communication Barge	Mobil Cranes	1	300	D	2	8.0
Pier 26-28	Installation of floating docks/piles	Mobil Crane	1	300	D	12	5.0
		Vibratory Pile Driver	1	100	D	5	8.0
Pier 26-28	Removal of floating docks/piles	Mobil Cranes	1	300	D	6	8.0
Pier 26-28	Dredging	Bucket dredge	1	1300	D	1	8.0

CONSTRUCTION EQUIPMENT

Pier 27-29	Installation of floating docks/piles	Mobil Crane	1	300	D	12	5.0
		Vibratory Pile Driver	1	100	D	5	8.0
Pier 27-29	Installation of mooring anchorings	Mobil Crane	1	300	D	11	5.0
		Vibratory Pile Driver	1	100	D	5	8.0
Pier 27-29	Removal of floating docks/piles	Mobil Cranes	1	300	D	6	8.0
Pier 27-29	Removal of mooring anchorings	Mobil Cranes	1	300	D	5	8.0
Pier 30-32	Installation of floating docks/wave attenuators/piles	Mobil Crane	1	300	D	17	5.0
		Vibratory Pile Driver	1	100	D	7	8.0
Pier 30-32	Removal of floating docks/wave attenuators/piles	Mobil Cranes	1	300	D	9	8.0
Pier 30-32	Pile Driving	Portable generators	2	80	D	44	5.0
		Welding machines	2	40	D	44	5.0
Pier 30-32	Installation of team base	Boomlift	1	83	D	60	10
		5k Warehouse lift	8	41	D	60	10
		10k Reach forklift	4	99	D	60	10
		Event 4000w Light Tower	4	12	D	60	10
Pier 30-32	Removal of team base	Boomlift	1	83	D	21	10
		5k Warehouse lift	8	41	D	21	10
		10k Reach forklift	4	99	D	21	10
		Event 4000w Light Tower	4	12	D	21	10
Pier 32-36	Installation of wave attenuators/piles	Mobil Crane	1	300	D	4	5.0
		Vibratory Pile Driver	1	100	D	2	8.0
Pier 32-36	Installation of mooring anchorings	Mobil Crane	1	300	D	3	5.0
		Vibratory Pile Driver	1	100	D	1	8.0
Pier 32-36	Removal of wave attenuators/piles	Mobil Cranes	1	300	D	2	8.0
Pier 32-36	Removal of mooring anchorings	Mobil Cranes	1	300	D	1	8.0
Pier 32-36	Dredging	Bucket dredge	1	1300	D	30	8.0
Pier 41-45 Water Basin	Installation of floating docks/piles	Mobil Crane	1	300	D	2	5.0
		Vibratory Pile Driver	1	100	D	1	8.0
Pier 41-45 Water Basin	Removal of floating docks/piles	Mobil Cranes	1	300	D	1	8.0
Pier 48 South/ China Basin	Installation of floating docks/piles	Mobil Crane	1	300	D	2	5.0
		Vibratory Pile Driver	1	100	D	1	8.0
Pier 48 South/ China Basin	Removal of floating docks/piles	Mobil Cranes	1	300	D	1	8.0
Pier 80	Removal of team base	Boomlift	1	83	D	21	10
		5k Warehouse lift	8	41	D	21	10
		10k Reach forklift	4	99	D	21	10
		Event 4000w Light Tower	4	12	D	21	10
Pier 80	Removal of floating docks/piles	Mobil Cranes	1	300	D	1	8.0
Fort Mason	Installation of floating docks/piles	Mobil Crane	1	300	D	4	5.0
		Vibratory Pile Driver	1	100	D	2	8.0
Fort Mason	Removal of Piles to Support Communication Barge	Mobil Cranes	1	300	D	2	8.0
Fort Mason	Removal of floating docks/piles	Mobil Cranes	1	300	D	2	8.0

ON-ROAD TRUCKS

2012 AC34 Trucks Activity Data Summary

Location	Activity/Components	Category	Truck Type (LT/MD/HVY)	Fuel type	Total one-way trips per day	Duration (days)	Total Idling hours per day	Operating hours per day (hr/day/truck)	On-site distance per one-way trip (mi/one-way trip)	Off-site distance per one-way trip (mi/one-way trip)	On-site speed (mph)	Off-site speed (mph)
		Dump trucks	HHD	D	4	5	0.7	8.0	0.25	20	5	45
		pickups	LDT2	G	12	5	2.0	4.0	0.25	20	5	45
Pier 30-32	Demolition of bldg	Flatbed Truck	HHD	D	5	2	0.8	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	5	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	5	0.3	5.0	0.25	20	5	42
Pier 80	Installation of floating docks/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	2	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	2	0.3	6.0	0.25	20	5	42
Pier 80	Removal of floating docks/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		6' Gas Flatbed	LDT2	G	8	60	1.3	5.0	0.25	20	5	45
		26' Bobtail Truck	HHD	D	8	60	1.3	5.0	0.25	20	5	45
Pier 80	Installation of team base	Flatbed Truck (HDT)	HHD	D	23	2	3.8	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	3	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	3	0.3	5.0	0.25	20	5	42
AC Village	Installation of floating docks/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	3	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	3	0.3	6.0	0.25	20	5	42
AC Village	Removal of floating docks/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
Fort Mason	Installation of Piles to Support Communication Barge	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45

2013 AC34 Trucks Activity Data Summary

Location	Activity/Components	Category	Truck Type (LT/MD/HVY)	Fuel type	Total one-way trips per day	Duration (days)	Total Idling hours per day	Operating hours per day (hr/day/truck)	On-site distance per one-way trip (mi/one-way trip)	Off-site distance per one-way trip (mi/one-way trip)	On-site speed (mph)	Off-site speed (mph)
		Pickup Trucks	LDT2	G	12	2	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	2	0.3	5.0	0.25	20	5	42
Pier 1	Installation of floating docks/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	1	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	1	0.3	6.0	0.25	20	5	42
Pier 1	Removal of floating docks/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	2	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	2	0.3	5.0	0.25	20	5	42
Pier 9-15 Water Basin	Installation of floating docks/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	1	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	1	0.3	6.0	0.25	20	5	42
Pier 9-15 Water Basin	Removal of floating docks/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	2	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	2	0.3	5.0	0.25	20	5	42
Pier 17-19	Installation of floating docks/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	1	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	1	0.3	6.0	0.25	20	5	42
Pier 17-19	Removal of floating docks/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	8	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	8	0.3	5.0	0.25	20	5	42
Pier 23	Installation of floating docks/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45

ON-ROAD TRUCKS

Pier 23	Installation of Piles to Support Communication Barge	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	4	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	4	0.3	6.0	0.25	20	5	42
Pier 23	Removal of floating docks/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	2	2.0	5.0	0.25	20	5	45
	Removal of Piles to Support Communication	Flatbed Truck	MHD	D	2	2	0.3	6.0	0.25	20	5	42
Pier 23	Barge	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	12	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	12	0.3	5.0	0.25	20	5	42
Pier 26-28	Installation of floating docks/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	6	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	6	0.3	6.0	0.25	20	5	42
Pier 26-28	Removal of floating docks/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		pickups	LDT2	G	12	1	2.0	2.0	0.25	20	5	45
Pier 26-28	Dredging (Pier 32-36)	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	12	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	12	0.3	5.0	0.25	20	5	42
Pier 27-29	Installation of floating docks/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
Pier 27-29	Installation of mooring anchorings	Flatbed Truck	HHD	D	4	2	0.7	6.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	6	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	6	0.3	6.0	0.25	20	5	42
Pier 27-29	Removal of floating docks/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	5	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	5	0.3	6.0	0.25	20	5	42
Pier 27-29	Removal of mooring anchorings	Flatbed Truck	HHD	D	1	5	0.2	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	17	2.0	5.0	0.25	20	5	45
	Installation of floating docks/wave	Flatbed Truck	MHD	D	2	17	0.3	5.0	0.25	20	5	42
Pier 30-32	attenuators/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	9	2.0	5.0	0.25	20	5	45
	Removal of floating docks/wave	Flatbed Truck	MHD	D	2	9	0.3	6.0	0.25	20	5	42
Pier 30-32	attenuators/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		pickups	LDT2	G	12	44	2.0	4.0	0.25	20	5	45
Pier 30-32	Pile Driving	Flatbed Truck	HHD	D	4	2	0.7	5.0	0.25	20	5	45
		6' Gas Flatbed	LDT2	G	8	60	1.3	5.0	0.25	20	5	45
		26' Bobtail Truck	HHD	D	8	60	1.3	5.0	0.25	20	5	45
Pier 30-32	Installation of team base	Flatbed Truck	HHD	D	23	2	3.8	5.0	0.25	20	5	45
		6' Gas Flatbed	LDT2	G	8	21	1.3	5.0	0.25	20	5	45
		26' Bobtail Truck	HHD	D	8	21	1.3	5.0	0.25	20	5	45
Pier 30-32	Removal of team base	Flatbed Truck	HHD	D	23	2	3.8	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	4	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	4	0.3	5.0	0.25	20	5	42
Pier 32-36	Installation of wave attenuators/piles	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
Pier 32-36	Installation of mooring anchorings	Flatbed Truck	HHD	D	4	2	0.7	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	2	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	2	0.3	6.0	0.25	20	5	42
Pier 32-36	Removal of wave attenuators/piles	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
		Pickup Trucks	LDT2	G	12	1	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	1	0.3	6.0	0.25	20	5	42
Pier 32-36	Removal of mooring anchorings	Flatbed Truck	HHD	D	1	1	0.2	5.0	0.25	20	5	45
		pickups	LDT2	G	12	30	2.0	2.0	0.25	20	5	45
Pier 32-36	Dredging	Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45

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Pier 41-45 Water Basin	Installation of floating docks/piles	Pickup Trucks	LDT2	G	12	2	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	2	0.3	5.0	0.25	20	5	42
		Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
Pier 41-45 Water Basin	Removal of floating docks/piles	Pickup Trucks	LDT2	G	12	1	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	1	0.3	6.0	0.25	20	5	42
		Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
Pier 48 South/ China Basin	Installation of floating docks/piles	Pickup Trucks	LDT2	G	12	2	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	2	0.3	5.0	0.25	20	5	42
		Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
Pier 48 South/ China Basin	Removal of floating docks/piles	Pickup Trucks	LDT2	G	12	1	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	1	0.3	6.0	0.25	20	5	42
		Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
Pier 80	Removal of floating docks/piles	Pickup Trucks	LDT2	G	12	1	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	1	0.3	6.0	0.25	20	5	42
		Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
Pier 80	Removal of team base	6' Gas Flatbed	LDT2	G	8	21	1.3	5.0	0.25	20	5	45
		26' Bobtail Truck	HHD	D	8	21	1.3	5.0	0.25	20	5	45
		Flatbed Truck	HHD	D	23	2	3.8	5.0	0.25	20	5	45
Fort Mason	Installation of floating docks/piles	Pickup Trucks	LDT2	G	12	4	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	4	0.3	5.0	0.25	20	5	42
		Flatbed Truck	HHD	D	2	2	0.3	5.0	0.25	20	5	45
Fort Mason	Removal of Piles to Support Communication Barge	Pickup Trucks	LDT2	G	12	2	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	2	0.3	6.0	0.25	20	5	42
		Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45
Fort Mason	Removal of floating docks/piles	Pickup Trucks	LDT2	G	12	2	2.0	5.0	0.25	20	5	45
		Flatbed Truck	MHD	D	2	2	0.3	6.0	0.25	20	5	42
		Flatbed Truck	HHD	D	1	2	0.2	5.0	0.25	20	5	45

WATER SOURCES

2012 AC34 Water Sources Activity Data Summary

Location	Activity/Components	Type	Equipment Count	HP	LF	Fuel Type	Duration (days)	Operating hours per day per boat
		Tug Boat - Main	1	1500	0.5	D	4	2.0
		Tug Boat - Aux	1	111	0.3	D	4	2.0
		Tug Boat - Main	1	1500	0.5	D	4	5.0
Pier 80	Installation of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	4	5.0
		Tug Boat - Main	1	1500	0.5	D	2	5.0
Pier 80	Removal of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	2	5.0
		Tug Boat - Main	1	1500	0.5	D	3	2.0
		Tug Boat - Aux	1	111	0.3	D	3	2.0
		Tug Boat - Main	1	1500	0.5	D	3	5.0
AC Village	Installation of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	3	5.0
		Tug Boat - Main	1	1500	0.5	D	3	5.0
AC Village	Removal of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	3	5.0
	Installation of Piles to Support	Tug Boat - Main	1	1500	0.5	D	4	2.0
Fort Mason	Communication Barge	Tug Boat - Aux	1	111	0.3	D	4	2.0

2013 AC34 Water Sources Activity Data Summary

Year	Activity/Components	Equipment Type	Equipment Count	HP	LF	Fuel Type	Duration (days)	Operating hours per day per boat
		Tug Boat - Main	1	1500	0.5	D	2	2.0
		Tug Boat - Aux	1	111	0.3	D	2	2.0
		Tug Boat - Main	1	1500	0.5	D	2	5.0
Pier 1	Installation of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	2	5.0
		Tug Boat - Main	1	1500	0.5	D	1	5.0
Pier 1	Removal of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	1	5.0
		Tug Boat - Main	1	1500	0.5	D	2	2.0
		Tug Boat - Aux	1	111	0.3	D	2	2.0
Pier 9-15 Water		Tug Boat - Main	1	1500	0.5	D	2	5.0
Basin	Installation of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	2	5.0
Pier 9-15 Water		Tug Boat - Main	1	1500	0.5	D	1	5.0
Basin	Removal of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	1	5.0
		Tug Boat - Main	1	1500	0.5	D	2	2.0
		Tug Boat - Aux	1	111	0.3	D	2	2.0
		Tug Boat - Main	1	1500	0.5	D	2	5.0
Pier 17-19	Installation of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	2	5.0
		Tug Boat - Main	1	1500	0.5	D	1	5.0
Pier 17-19	Removal of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	1	5.0
		Tug Boat - Main	1	1500	0.5	D	6	2.0
		Tug Boat - Aux	1	111	0.3	D	6	2.0
		Tug Boat - Main	1	1500	0.5	D	6	5.0
Pier 23	Installation of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	6	5.0
	Installation of Piles to Support	Tug Boat - Main	1	1500	0.5	D	4	2.0
Pier 23	Communication Barge	Tug Boat - Aux	1	111	0.3	D	4	2.0
		Tug Boat - Main	1	1500	0.5	D	4	5.0
Pier 23	Removal of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	4	5.0

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		Tug Boat - Main	1	1500	0.5	D	2	5.0
Pier 23	Removal of Piles to Support Communication Barge	Tug Boat - Aux	1	111	0.3	D	2	5.0
		Tug Boat - Main	1	1500	0.5	D	10	2.0
		Tug Boat - Aux	1	111	0.3	D	10	2.0
		Tug Boat - Main	1	1500	0.5	D	10	5.0
Pier 26-28	Installation of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	10	5.0
		Tug Boat - Main	1	1500	0.5	D	6	5.0
Pier 26-28	Removal of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	6	5.0
		Bottom dump skows - Main	3	275	0.5	D	1	2.0
		Bottom dump skows - Aux	3	111	0.3	D	1	2.0
		Tugs (ocean going) - Main	1	2500	0.3	D	1	2.0
		Tugs (ocean going) - Aux	1	110	0.4	D	1	2.0
		Tugs (ocean going) - Main	1	2500	0.3	D	1	6.0
		Tugs (ocean going) - Aux	1	110	0.4	D	1	6.0
		Service boat - Main	1	500	0.5	D	1	3.0
Pier 26-28	Dredging	Service boat - Aux	1	111	0.3	D	1	3.0
		Tug Boat - Main	1	1500	0.5	D	10	2.0
		Tug Boat - Aux	1	111	0.3	D	10	2.0
		Tug Boat - Main	1	1500	0.5	D	10	5.0
Pier 27-29	Installation of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	10	5.0
		Tug Boat - Main	1	1500	0.5	D	9	2.0
Pier 27-29	Installation of mooring anchorings	Tug Boat - Aux	1	111	0.3	D	9	2.0
		Tug Boat - Main	1	1500	0.5	D	6	5.0
Pier 27-29	Removal of floating docks/piles	Tug Boat - Aux	1	111	0.3	D	6	5.0
		Tug Boat - Main	1	1500	0.5	D	5	5.0
Pier 27-29	Removal of mooring anchorings	Tug Boat - Aux	1	111	0.3	D	5	5.0
		Tug Boat - Main	1	1500	0.5	D	14	2.0
		Tug Boat - Aux	1	111	0.3	D	14	2.0
		Tug Boat - Main	1	1500	0.5	D	14	5.0
Pier 30-32	Installation of floating docks/wave attenuators/piles	Tug Boat - Aux	1	111	0.3	D	14	5.0
		Tug Boat - Main	1	1500	0.5	D	9	5.0
Pier 30-32	Removal of floating docks/wave attenuators/piles	Tug Boat - Aux	1	111	0.3	D	9	5.0
		Support tug - Main	1	1500	0.5	D	30	5.0
		Support tug - Aux	1	111	0.3	D	30	5.0
		Service boat - Main	1	1500	0.5	D	44	3.0
Pier 30-32	Pile Driving	Service boat - Aux	1	111	0.3	D	44	3.0
		Tug Boat - Main	1	1500	0.5	D	4	2.0
		Tug Boat - Aux	1	111	0.3	D	4	2.0
		Tug Boat - Main	1	1500	0.5	D	3	5.0
Pier 32-36	Installation of wave attenuators/piles	Tug Boat - Aux	1	111	0.3	D	3	5.0
		Tug Boat - Main	1	1500	0.5	D	2	2.0
Pier 32-36	Installation of mooring anchorings	Tug Boat - Aux	1	111	0.3	D	2	2.0
		Tug Boat - Main	1	1500	0.5	D	2	5.0
Pier 32-36	Removal of wave attenuators/piles	Tug Boat - Aux	1	111	0.3	D	2	5.0
		Tug Boat - Main	1	1500	0.5	D	1	5.0
Pier 32-36	Removal of mooring anchorings	Tug Boat - Aux	1	111	0.3	D	1	5.0

WATER SOURCES

Pier 32-36	Dredging	Bottom dump skows - Main	3	275	0.5	D	30	2.0
		Bottom dump skows - Aux	3	111	0.3	D	30	2.0
		Tugs (ocean going) - Main	1	2500	0.3	D	30	2.0
		Tugs (ocean going) - Aux	1	110	0.4	D	30	2.0
		Tugs (ocean going) - Main	1	2500	0.3	D	30	6.0
		Tugs (ocean going) - Aux	1	110	0.4	D	30	6.0
		Service boat - Main	1	500	0.5	D	30	3.0
		Service boat - Aux	1	111	0.3	D	30	3.0
Pier 41-45 Water Basin	Removal of floating docks/piles	Tug Boat - Main	1	1500	0.5	D	1	5.0
		Tug Boat - Aux	1	111	0.3	D	1	5.0
Pier 48 South/ China Basin	Removal of floating docks/piles	Tug Boat - Main	1	1500	0.5	D	1	5.0
		Tug Boat - Aux	1	111	0.3	D	1	5.0
Pier 80	Removal of floating docks/piles	Tug Boat - Main	1	1500	0.5	D	1	5.0
		Tug Boat - Aux	1	111	0.3	D	1	5.0
Pier 41-45 Water Basin	Installation of floating docks/piles	Tug Boat - Main	1	1500	0.5	D	2	2.0
		Tug Boat - Aux	1	111	0.3	D	2	2.0
		Tug Boat - Main	1	1500	0.5	D	2	5.0
		Tug Boat - Aux	1	111	0.3	D	2	5.0
Pier 48 South/ China Basin	Installation of floating docks/piles	Tug Boat - Main	1	1500	0.5	D	2	2.0
		Tug Boat - Aux	1	111	0.3	D	2	2.0
		Tug Boat - Main	1	1500	0.5	D	2	5.0
		Tug Boat - Aux	1	111	0.3	D	2	5.0
Fort Mason	Installation of floating docks/piles	Tug Boat - Main	1	1500	0.5	D	3	2.0
		Tug Boat - Aux	1	111	0.3	D	3	2.0
		Tug Boat - Main	1	1500	0.5	D	3	5.0
		Tug Boat - Aux	1	111	0.3	D	3	5.0
Fort Mason	Removal of Piles to Support Communication Barge	Tug Boat - Main	1	1500	0.5	D	2	5.0
		Tug Boat - Aux	1	111	0.3	D	2	5.0
Fort Mason	Removal of floating docks/piles	Tug Boat - Main	1	1500	0.5	D	2	5.0
		Tug Boat - Aux	1	111	0.3	D	2	5.0

CONSTRUCTION EQUIPMENT

2012 AC34 Construction Equipment Emissions Factors

Equipment Type	HP	Fuel Type	Emissions Factors (g/bhp-hr)									
			ROG	CO	NOX	SO2	PM	DPM	PM2.5	CH4	N2O	CO2
Hoe-ram	180	D	0.49	1.24	4.24	0.01	0.14	0.14	0.13	0.04	0.00	568.30
Backhoe /loader	180	D	0.49	1.24	4.24	0.01	0.14	0.14	0.13	0.04	0.00	568.30
Portable generators & jack hammers	80	D	1.24	4.10	6.22	0.01	0.59	0.59	0.54	0.10	0.00	568.30
Mobil Crane	300	D	0.61	1.80	4.84	0.01	0.18	0.18	0.17	0.05	0.00	568.30
Vibratory Pile Driver	100	D	1.31	4.14	6.62	0.01	0.60	0.60	0.56	0.10	0.00	568.30
Boomlift	83	D	1.31	4.14	6.62	0.01	0.60	0.60	0.56	0.10	0.00	568.30
5k Warehouse lift	41	D	2.31	6.48	5.75	0.01	0.52	0.52	0.48	0.18	0.00	568.30
10k Reach forklift	99	D	1.04	3.99	5.45	0.01	0.50	0.50	0.46	0.08	0.00	568.30
Event 4000w Light Tower	12	D	1.02	3.87	5.87	0.01	0.34	0.34	0.31	0.08	0.00	568.30

Note: Construction equipment emission factors were calculated from OFFROAD2007.

2013 AC34 Construction Equipment Emissions Factors

Equipment Type	HP	Fuel Type	Emissions Factors (g/bhp-hr)									
			ROG	CO	NOX	SO2	PM	DPM	PM2.5	CH4	N2O	CO2
Mobil Crane	300	D	0.58	1.67	4.49	0.01	0.16	0.16	0.15	0.04	0.00	568.30
Vibratory Pile Driver	100	D	1.22	4.10	6.24	0.01	0.56	0.56	0.51	0.09	0.00	568.30
Bucket dredge	1300	D	0.49	1.39	4.43	0.01	0.15	0.15	0.14	0.04	0.00	568.30
Portable generators	80	D	0.93	3.57	5.48	0.01	0.42	0.42	0.39	0.07	0.00	568.30
Welding machines	40	D	2.47	5.97	5.53	0.01	0.52	0.52	0.48	0.19	0.00	568.30
Boomlift	83	D	1.22	4.10	6.24	0.01	0.56	0.56	0.51	0.09	0.00	568.30
5k Warehouse lift	41	D	2.00	6.25	5.53	0.01	0.46	0.46	0.43	0.15	0.00	568.30
10k Reach forklift	99	D	0.93	3.95	5.04	0.01	0.43	0.43	0.40	0.07	0.00	568.30
Event 4000w Light Tower	12	D	0.97	3.80	5.62	0.01	0.32	0.32	0.29	0.07	0.00	568.30

Note: Construction equipment emission factors were calculated from OFFROAD2007.

TRUCKS

2012 AC34 Trucks Emissions Factors - Idling

Category	Truck Type	Fuel	Idling Emissions Factors (g/hr)											
	(LT/MD/HVY)	type	D-ROGexh	G-ROGexh	G-ROGevp	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Dump trucks	HHD	D	11.46	0.00	0.00	49.27	112.64	0.06	1.50	1.50	1.38	0.00	0.00	6541.72
Flatbed Truck	HHD	D	11.46	0.00	0.00	49.27	112.64	0.06	1.50	1.50	1.38	0.00	0.00	6541.72
Pickup Trucks	LDT2	G	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Flatbed Truck	MHD	D	3.17	0.00	0.00	26.30	75.05	0.04	0.93	0.93	0.86	0.00	0.00	4098.00
6' Gas Flatbed	LDT2	G	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26' Bobtail Truck	HHD	D	11.46	0.00	0.00	49.27	112.64	0.06	1.50	1.50	1.38	0.00	0.00	6541.72

2012 AC34 Trucks Emissions Factors - On-site Moving at 5 mph

Category	Truck Type	Fuel	On-Site Moving Emissions Factors (g/mi)											
	(LT/MD/HVY)	type	D-ROGexh	G-ROGexh	G-ROGevp	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Dump trucks	HHD	D	8.61	0.00	0.00	14.10	30.55	0.04	1.76	1.76	1.62	0.01	0.01	3845.36
Flatbed Truck	HHD	D	8.61	0.00	0.00	14.10	30.55	0.04	1.76	1.76	1.62	0.01	0.01	3845.36
Pickup Trucks	LDT2	G	0.00	0.37	0.51	5.15	0.58	0.01	0.12	0.00	0.11	0.00	0.01	1189.04
Flatbed Truck	MHD	D	0.53	0.00	0.00	6.79	10.40	0.01	0.63	0.63	0.58	0.00	0.01	1505.00
6' Gas Flatbed	LDT2	G	0.00	0.37	0.51	5.15	0.58	0.01	0.12	0.00	0.11	0.00	0.01	1189.04
26' Bobtail Truck	HHD	D	8.61	0.00	0.00	14.10	30.55	0.04	1.76	1.76	1.62	0.01	0.01	3845.36

2012 AC34 Trucks Emissions Factors - Off-site Moving at Composite Speed

Category	Truck Type	Fuel	Off-Site Moving Emissions Factors (g/mi)											
	(LT/MD/HVY)	type	D-ROGexh	G-ROGexh	G-ROGevp	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Dump trucks	HHD	D	0.74	0.00	0.00	3.12	11.62	0.02	0.44	0.44	0.40	0.01	0.01	1778.49
Flatbed Truck	HHD	D	0.74	0.00	0.00	3.12	11.62	0.02	0.44	0.44	0.40	0.01	0.01	1778.49
Pickup Trucks	LDT2	G	0.00	0.08	0.05	2.65	0.36	0.00	0.02	0.00	0.02	0.00	0.00	464.39
Flatbed Truck	MHD	D	0.15	0.00	0.00	1.49	7.09	0.01	0.18	0.18	0.16	0.00	0.00	1379.58
6' Gas Flatbed	LDT2	G	0.00	0.08	0.05	2.65	0.36	0.00	0.02	0.00	0.02	0.00	0.00	464.39
26' Bobtail Truck	HHD	D	0.74	0.00	0.00	3.12	11.62	0.02	0.44	0.44	0.40	0.01	0.01	1778.49

Note: Trucks emission factors from EMFAC2007

2013 AC34 Trucks Emissions Factors - Idling

Category	Truck Type	Fuel	Idling Emissions Factors (g/hr)											
	(LT/MD/HVY)	type	D-ROGexh	G-ROGexh	G-ROGevp	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Pickup Trucks	LDT2	G	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Flatbed Truck	MHD	D	3.17	0.00	0.00	26.30	75.05	0.04	0.92	0.92	0.84	0.00	0.00	4098.00
Flatbed Truck	HHD	D	10.96	0.00	0.00	48.55	113.98	0.06	1.35	1.35	1.24	0.00	0.00	6541.71
6' Gas Flatbed	LDT2	G	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26' Bobtail Truck	HHD	D	10.96	0.00	0.00	48.55	113.98	0.06	1.35	1.35	1.24	0.00	0.00	6541.71

2012 AC34 Trucks Emissions Factors - On-site Moving at 5 mph

Category	Truck Type	Fuel	On-Site Moving Emissions Factors (g/mi)											
	(LT/MD/HVY)	type	D-ROGexh	G-ROGexh	G-ROGevp	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Pickup Trucks	LDT2	G	0.00	0.28	0.47	4.12	0.52	0.01	0.12	0.00	0.11	0.00	0.01	1188.65
Flatbed Truck	MHD	D	0.51	0.00	0.00	6.56	9.37	0.01	0.60	0.60	0.55	0.00	0.01	1505.00

TRUCKS

Flatbed Truck	HHD	D	7.81	0.00	0.00	12.93	27.24	0.04	1.50	1.50	1.38	0.01	0.01	3845.36
6' Gas Flatbed	LDT2	G	0.00	0.28	0.47	4.12	0.52	0.01	0.12	0.00	0.11	0.00	0.01	1188.65
26' Bobtail Truck	HHD	D	7.81	0.00	0.00	12.93	27.24	0.04	1.50	1.50	1.38	0.01	0.01	3845.36

2013 AC34 Trucks Emissions Factors - Off-site Moving at Composite Speed

Category	Truck Type (LT/MD/HVY)	Fuel type	Off-Site Moving Emissions Factors (g/mi)											
			D-ROGexh	G-ROGexh	G-ROGevp	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Pickup Trucks	LDT2	G	0.00	0.05	0.04	2.14	0.31	0.00	0.03	0.00	0.02	0.00	0.00	464.24
Flatbed Truck	MHD	D	0.14	0.00	0.00	1.44	6.38	0.01	0.17	0.17	0.16	0.00	0.00	1379.58
Flatbed Truck	HHD	D	0.67	0.00	0.00	2.87	10.27	0.02	0.39	0.39	0.36	0.01	0.01	1778.49
6' Gas Flatbed	LDT2	G	0.00	0.05	0.04	2.14	0.31	0.00	0.03	0.00	0.02	0.00	0.00	464.24
26' Bobtail Truck	HHD	D	0.67	0.00	0.00	2.87	10.27	0.02	0.39	0.39	0.36	0.01	0.01	1778.49

Note: Trucks emission factors from EMFAC2007

WATER SOURCES

Type of Vessels	Engine	Fuel type	LF	HP	Emission Factors (g/bhp-hr)						
					ROG	CO	NOX	SO2	PM	DPM	PM2.5
Tug Boat	Main	D	0.5	1500	1.24	3.72	14.22	184.00	0.59	0.59	0.57
	Auxiliary	D	0.31	111	2.10	5.59	13.47	184.00	0.72	0.72	0.70
Assist tug	Main	D	0.5	1500	1.24	3.72	14.22	184.00	0.59	0.59	0.57
	Auxiliary	D	0.31	111	2.10	5.59	13.47	184.00	0.72	0.72	0.70
Bottom dump skows	Main	D	0.5	275	1.24	3.72	14.22	184.00	0.59	0.59	0.57
	Auxiliary	D	0.31	111	2.10	5.59	13.47	184.00	0.72	0.72	0.70
Tugs (ocean going)	Main	D	0.31	2500	0.72	2.79	2.79	184.00	0.48	0.48	0.47
	Auxiliary	D	0.43	110	0.98	3.25	3.25	184.00	0.67	0.67	0.65
Service boat	Main	D	0.50	1500	1.24	3.72	14.22	184.00	0.59	0.59	0.57
	Auxiliary	D	0.31	111	2.10	5.59	13.47	184.00	0.72	0.72	0.70

Note: Water sources emission factors from SF Bay Seaport Air Emissions Inventory; POSF 2005 Emissions Inventory

CONSTRUCTION EQUIPMENT

2012 AC34 Construction Equipment Emissions Summary

Location	Total Annual Emissions (tpy)									
	ROG	CO	NOX	SO2	PM	DPM	PM2.5	CH4	N2O	CO2
Pier 80	0.19	0.63	0.76	0.00	0.07	0.07	0.06	0.01	0.00	75.14
Marina Green	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	2.40
Fort Mason	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.64
Pier 32-36, 30-32, 26-28	0.01	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	5.05
Pier 23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 17-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 41-45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aquatic Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total 2012 Annual	**0.21**	**0.66**	**0.84**	**0.00**	**0.07**	**0.07**	**0.06**	**0.02**	**0.00**	**84.23**

2013 AC34 Construction Equipment Emissions Summary

Location	Total Annual Emissions (tpy)									
	ROG	CO	NOX	SO2	PM	DPM	PM2.5	CH4	N2O	CO2
Pier 27-29	0.01	0.04	0.10	0.00	0.00	0.00	0.00	0.00	0.00	12.43
Pier 80	0.06	0.21	0.25	0.00	0.02	0.02	0.02	0.00	0.00	25.85
Marina Green	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fort Mason	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	3.10
Pier 32-36, 30-32, 26-28	0.35	1.16	1.77	0.00	0.11	0.11	0.10	0.03	0.00	201.03
Pier 23	0.01	0.02	0.06	0.00	0.00	0.00	0.00	0.00	0.00	6.84
Pier 48	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.12
Pier 1	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.12
Pier 9-15	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.12
Pier 17-19	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.12
Pier 41-45	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.12
Aquatic Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46
Total 2013 Annual	**0.44**	**1.47**	**2.25**	**0.00**	**0.14**	**0.14**	**0.13**	**0.03**	**0.00**	**255.32**

TRUCKS

2012 AC34 Truck Emissions Summary

Location	Total Annual Emissions (tpy)											
	D-ROGexh	G-ROGexh	G-ROGevap	CO	NOX	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Pier 80	0.01	0.00	0.00	0.08	0.16	0.00	0.01	0.01	0.01	0.00	0.00	28.46
Marina Green	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.39
Fort Mason	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17
Pier 32-36, 30-32, 26-28	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.88
Pier 23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 17-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 41-45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aquatic Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total 2012 Annual	**0.01**	**0.00**	**0.00**	**0.09**	**0.17**	**0.00**	**0.01**	**0.01**	**0.01**	**0.00**	**0.00**	**31.90**

Note: Truck emissions include both on-site and off-site emissions.

2013 AC34 Truck Emissions Summary

Location	Total Annual Emissions (tpy)											
	D-ROGexh	G-ROGexh	G-ROGevap	CO	NOX	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Pier 27-29	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	5.16
Pier 80	0.00	0.00	0.00	0.03	0.06	0.00	0.00	0.00	0.00	0.00	0.00	10.92
Marina Green	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fort Mason	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.85
Pier 32-36, 30-32, 26-28	0.02	0.00	0.00	0.17	0.23	0.00	0.01	0.01	0.01	0.00	0.00	58.34
Pier 23	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	3.16
Pier 48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82
Pier 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82
Pier 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82
Pier 17-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82
Pier 41-45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82
Aquatic Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Total 2013 Annual	**0.0**	**0.0**	**0.0**	**0.2**	**0.3**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**83.5**

Note: Truck emissions include both on-site and off-site emissions.

WATER SOURCES

2012 AC34 Water Source Emissions Summary

Location	Total Annual Emissions (tpy)						
	ROG	CO	NOX	SO2	PM	DPM	PM2.5
Pier 80	0.04	0.12	0.47	0.00	0.02	0.02	0.02
Marina Green	0.04	0.12	0.44	0.00	0.02	0.02	0.02
Fort Mason	0.01	0.03	0.10	0.00	0.00	0.00	0.00
Pier 32-36, 30-32, 26-28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 17-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pier 41-45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aquatic Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total 2012 Annual	**0.09**	**0.27**	**1.01**	**0.00**	**0.04**	**0.04**	**0.04**

2013 AC34 Water Source Emissions Summary

Location	Total Annual Emissions (tpy)						
	ROG	CO	NOX	SO2	PM	DPM	PM2.5
Pier 27-29	0.16	0.47	1.75	0.00	0.07	0.07	0.07
Pier 80	0.01	0.02	0.06	0.00	0.00	0.00	0.00
Marina Green	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fort Mason	0.05	0.13	0.50	0.00	0.02	0.02	0.02
Pier 32-36, 30-32, 26-28	0.88	2.76	8.50	0.00	0.44	0.44	0.43
Pier 23	0.09	0.26	0.98	0.00	0.04	0.04	0.04
Pier 48	0.02	0.06	0.23	0.00	0.01	0.01	0.01
Pier 1	0.02	0.06	0.23	0.00	0.01	0.01	0.01
Pier 9-15	0.02	0.06	0.23	0.00	0.01	0.01	0.01
Pier 17-19	0.02	0.06	0.23	0.00	0.01	0.01	0.01
Pier 41-45	0.02	0.06	0.23	0.00	0.01	0.01	0.01
Aquatic Park	0.00	0.01	0.04	0.00	0.00	0.00	0.00
Total 2013 Annual	**1.3**	**4.0**	**13.0**	**0.0**	**0.6**	**0.6**	**0.6**

CONSTRUCTION EQUIPMENT

2012 Cruise Terminal Construction Equipment Data Summary - Demolition of Existing Building

Location	Activity/Components	Equipment Type	Equipment Count	HP	Fuel Type	Duration (days)	Operating Hours per Day
		Truck cranes	2	350	D	20	8.0
		Hydraulic crane	1	160	D	20	8.0
		980 Loader	1	318	D	20	6.0
Pier 27-29	Demolition of bldg	Backhoe-loader	1	180	D	20	6.0

2013/2014 Cruise Terminal Construction Equipment Data Summary - Cold Shell Construction

		Pump	2	53	D	60	8.0
		Cranes	1	300	D	60	5.0
Pier 27-29	Paving/ Concrete Improvement	Paver system (AC)	1	250	D	60	8.0
		Land crane	3	399	D	365	4.0
		Backhoe/ Loader	2	108	D	365	8.0
		Generator	4	49	D	365	8.0
		Compressor	10	106	D	365	8.0
		Forklift	8	83	D	365	8.0
Pier 27-29	New building construction	Welding machine	8	40	D	60	5.0

ON-ROAD TRUCKS

2012 Cruise Terminal Construction Equipment Data Summary - Demolition of Existing Building

Location	Activity/Components	Category	Truck Type (LT/MD/HVY)	Fuel type	Total one-way trips per day	Duration (days)	Total Idling hours per day	Operating hours per day (hr/day/truck)	Total distance per day (mi/day)	On-site distance per one-way trip (mi/one-way trip)	Off-site distance per one-way trip (mi/one-way trip)	On-site speed (mph)	Off-site speed (mph)
		pickups	LDT2	G	18	20	3.0	4.0	4.5	0.25	20	5	45
		Fleet of bathtub dumps	HHD	D	2	20	0.3	10.0	0.5	0.25	20	5	45
		Water truck	HHD	D	1	20	0.2	2.0	0.3	0.25	20	5	45
Pier 27-29	Demolition of bldg	Flatbed Truck	HHD	D	5	2	0.8	5.0	1.3	0.25	20	5	45

2013/2014 Cruise Terminal Construction Equipment Data Summary - Cold Shell Construction

		Concrete truck	HHD	D	4	60	0.7	5.0	1.0	0.25	20	5	45
		Pickups	LDT2	D	8	60	1.3	4.0	2.0	0.25	20	5	45
		Flatbed trucks	HHD	D	4	60	0.7	5.0	1.0	0.25	20	5	45
		Dump trucks	HHD	D	4	60	0.7	8.0	1.0	0.25	20	5	45
Pier 27-29	Paving/ Concrete Improvement	Flatbed Truck	HHD	D	2	2	0.3	5.0	0.5	0.25	20	5	45
Pier 27-29	Pile driving	Pickups	LDT2	G	8	30	1.3	4.0	2.0	0.25	20	5	45
		Flatbed trucks	HHD	D	8	365	1.3	5.0	2.0	0.25	20	5	45
		Dump trucks	HHD	D	4	365	0.7	8.0	1.0	0.25	20	5	45
		Pickups	LDT2	G	48	365	8.0	4.0	12.0	0.25	20	5	45
Pier 27-29	New building construction	Flatbed Truck	HHD	D	43	2	7.2	5.0	10.8	0.25	20	5	45

WATER SOURCES

2013/2014 Cruise Terminal Construction Equipment Data Summary - Cold Shell Construction

Location	Activity/Components	Type	Equipment Count	HP	LF	Fuel Type	Duration (days)	Operating hours per day per boat
Pier 27-29	Pile Driving	Assist tug - Main	1	1500	0.5	D	30	5.0
		Assist tug - Aux	1	111	0.31	D	30	5.0
Pier 27-29	New building construction	Assist tug - Main	1	1500	0.5	D	30	5.0
		Assist tug - Aux	1	111	0.31	D	30	5.0

2014 Cruise Terminal Construction Summary - Building Interior

Assume 90%/10% pre-/post race construction emissions at Pier 27-29*

CONSTRUCTION EQUIPMENT

Cruise Terminal Construction Equipment Emissions Factors

Equipment Type	HP	Fuel Type	Emissions Factors (g/bhp-hr)									
			ROG	CO	NOX	SO2	PM	DPM	PM2.5	CH4	N2O	CO2
Truck cranes	350	D	0.61	1.80	4.84	0.01	0.18	0.18	0.17	0.05	0.00	568.30
Hydraulic crane	160	D	0.91	3.42	5.84	0.01	0.34	0.34	0.31	0.07	0.00	568.30
980 Loader	318	D	0.46	1.27	3.73	0.01	0.13	0.13	0.12	0.04	0.00	568.30
Backhoe-loader	180	D	0.49	1.24	4.24	0.01	0.14	0.14	0.13	0.04	0.00	568.30
Pump	53	D	1.05	3.66	5.94	0.01	0.48	0.48	0.44	0.08	0.00	568.30
Cranes	300	D	0.61	1.80	4.84	0.01	0.18	0.18	0.17	0.05	0.00	568.30
Paver system (AC)	250	D	0.75	1.86	6.05	0.01	0.24	0.24	0.22	0.06	0.00	568.30
Land crane	399	D	0.61	1.80	4.84	0.01	0.18	0.18	0.17	0.05	0.00	568.30
Backhoe/ Loader	108	D	0.98	3.91	5.39	0.01	0.47	0.47	0.44	0.08	0.00	568.30
Generator	49	D	2.05	5.03	5.49	0.01	0.47	0.47	0.43	0.16	0.00	568.30
Compressor	106	D	1.30	4.09	6.51	0.01	0.61	0.61	0.56	0.10	0.00	568.30
Forklift	83	D	1.04	3.99	5.45	0.01	0.50	0.50	0.46	0.08	0.00	568.30
Welding machine	40	D	2.70	6.19	5.75	0.01	0.56	0.56	0.52	0.21	0.00	568.30

TRUCKS

Cruise Terminal Construction On-Road Trucks Emissions Factors - Idling

Category	Truck Type	Fuel type	Idling Emissions Factors (g/hr)											
	(LT/MD/HV		D-ROGexh	G-ROGexh	G-ROGevp	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Fleet of bathtub dumps	HHD	D	11.46	0.00	0.00	49.27	112.64	0.06	1.50	1.50	1.38	0.00	0.00	6541.72
Water truck	HHD	D	11.46	0.00	0.00	49.27	112.64	0.06	1.50	1.50	1.38	0.00	0.00	6541.72
Flatbed Truck	HHD	D	11.46	0.00	0.00	49.27	112.64	0.06	1.50	1.50	1.38	0.00	0.00	6541.72
Concrete truck	HHD	D	11.46	0.00	0.00	49.27	112.64	0.06	1.50	1.50	1.38	0.00	0.00	6541.72
Pickups	LDT2	D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dump trucks	HHD	D	11.46	0.00	0.00	49.27	112.64	0.06	1.50	1.50	1.38	0.00	0.00	6541.72
Pickups	LDT2	G	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Cruise Terminal Construction On-Road Trucks Emissions Factors - On-site at 5 mph

Category	Truck Type	Fuel type	On-Site Moving Emissions Factors (g/mi)											
	(LT/MD/HV		D-ROGexh	G-ROGexh	G-ROGevp	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Fleet of bathtub dumps	HHD	D	8.61	0.00	0.00	14.10	30.55	0.04	1.76	1.76	1.62	0.01	0.01	3845.36
Water truck	HHD	D	8.61	0.00	0.00	14.10	30.55	0.04	1.76	1.76	1.62	0.01	0.01	3845.36
Flatbed Truck	HHD	D	8.61	0.00	0.00	14.10	30.55	0.04	1.76	1.76	1.62	0.01	0.01	3845.36
Concrete truck	HHD	D	8.61	0.00	0.00	14.10	30.55	0.04	1.76	1.76	1.62	0.01	0.01	3845.36
Pickups	LDT2	D	0.27	0.00	0.00	2.52	2.05	0.00	0.21	0.21	0.19	0.00	0.01	350.24
Dump trucks	HHD	D	8.61	0.00	0.00	14.10	30.55	0.04	1.76	1.76	1.62	0.01	0.01	3845.36
Pickups	LDT2	G	0.00	0.37	0.51	5.15	0.58	0.01	0.12	0.00	0.11	0.00	0.01	1189.04

Cruise Terminal Construction On-Road Trucks Emissions Factors - Off-site Moving at Composite Speed

Category	Truck Type	Fuel type	Off-Site Moving Emissions Factors (g/mi)											
	(LT/MD/HV		D-ROGexh	G-ROGexh	G-ROGevp	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Fleet of bathtub dumps	HHD	D	0.74	0.00	0.00	3.12	11.62	0.02	0.44	0.44	0.40	0.01	0.01	1778.49
Water truck	HHD	D	0.74	0.00	0.00	3.12	11.62	0.02	0.44	0.44	0.40	0.01	0.01	1778.49
Flatbed Truck	HHD	D	0.74	0.00	0.00	3.12	11.62	0.02	0.44	0.44	0.40	0.01	0.01	1778.49
Concrete truck	HHD	D	0.74	0.00	0.00	3.12	11.62	0.02	0.44	0.44	0.40	0.01	0.01	1778.49
Pickups	LDT2	D	0.07	0.00	0.00	0.65	1.64	0.00	0.07	0.07	0.06	0.00	0.00	350.24
Dump trucks	HHD	D	0.74	0.00	0.00	3.12	11.62	0.02	0.44	0.44	0.40	0.01	0.01	1778.49
Pickups	LDT2	G	0.00	0.08	0.05	2.65	0.36	0.00	0.02	0.00	0.02	0.00	0.00	464.39

WATER SOURCES

Type of Vessels	Engine	LF	HP	Adjusted EF (grams / hp-hr)						
				ROG	CO	NOX	SO2	PM	DPM	PM2.5
Assist tug	Main	0.5	1500	1.24	3.72	14.22	184.00	0.59	0.59	0.57
	Auxiliary	0.31	111	2.10	5.59	13.47	184.00	0.72	0.72	0.70
Tug Boat	Main	0.5	1500	1.24	3.72	14.22	184.00	0.59	0.59	0.57
	Auxiliary	0.31	111	2.10	5.59	13.47	184.00	0.72	0.72	0.70

CONSTRUCTION EQUIPMENT

2012 Cruise Terminal Construction Equipment Emissions Summary - Demolition of Existing Building

Location	Total Annual Emissions (tpy)									
	ROG	CO	NOX	SO2	PM	DPM	PM2.5	CH4	N2O	CO2
Pier 27-29	0.04	0.12	0.31	0.00	0.01	0.01	0.01	0.00	0.00	38.63

2013/2014 Cruise Terminal Construction Equipment Emissions Summary - Cold Shell Construction

Location	Total Annual Emissions (tpy)									
	ROG	CO	NOX	SO2	PM	DPM	PM2.5	CH4	N2O	CO2
Pier 27-29	3.63	11.35	17.87	0.02	1.47	1.47	1.35	0.28	0.00	1,743.77

2014 Cruise Terminal Construction Equipment Emissions Summary - Building Interior

Location	Total Annual Emissions (tpy)									
	ROG	CO	NOX	SO2	PM	DPM	PM2.5	CH4	N2O	CO2
Pier 27-29	0.41	1.28	2.03	0.00	0.17	0.17	0.15	0.03	0.00	199.43

Note: Building Interior construction emissions at Pier 27-29 are assumed to be 10% of total Cruise Terminal construction

TRUCKS

2012 Cruise Terminal Construction Truck Emissions Summary - Demolition of Existing Building

Location	Total Annual Emissions (tpy)											
	D-ROGexh	G-ROGexh	G-ROGevap	CO	NOX	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Pier 27-29	0.00	0.00	0.00	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	6.71

2013/2014 Cruise Terminal Construction Truck Emissions Summary - Cold Shell Construction

Location	Total Annual Emissions (tpy)											
	D-ROGexh	G-ROGexh	G-ROGevap	CO	NOX	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Pier 27-29	0.11	0.03	0.03	1.52	1.63	0.00	0.06	0.05	0.06	0.00	0.00	407.84

2014 Cruise Terminal Construction Truck Emissions Summary - Building Interior

Location	Total Annual Emissions (tpy)											
	D-ROGexh	G-ROGexh	G-ROGevap	CO	NOX	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Pier 27-29	0.01	0.00	0.00	0.17	0.19	0.00	0.01	0.01	0.01	0.00	0.00	46.63

Notes:

1) Truck emissions include those from both on-site and off-site activities

2) Building Interior construction emissions at Pier 27-29 are assumed to be 10% of total Cruise Terminal construction

WATER SOURCES

2013/2014 Cruise Terminal Construction Water Source Emissions Summary - Cold Shell Construction

Location	Total Annual Emissions (tpy)						
	ROG	CO	NOX	SO2	PM	DPM	PM2.5
Pier 27-29	0.33	0.99	3.68	0.00	0.15	0.15	0.15

2014 Cruise Terminal Construction Water Source Emissions Summary - Building Interior

Location	Total Annual Emissions (tpy)						
	ROG	CO	NOX	SO2	PM	DPM	PM2.5
Pier 27-29	0.05	0.16	0.60	0.00	0.03	0.03	0.02

Note: Building Interior construction emissions at Pier 27-29 are assumed to be 10% of total Cruise Terminal construction

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Urbemis 2007 Version 9.2.4

Summary Report for Summer Emissions (Pounds/Day)

File Name: C:\Documents and Settings\cls\Application Data\Urbemis\Version9a\Projects\Cruise Terminal Phase 2 Construction.urb924

Project Name: Cruise Terminal Phase 2

Project Location: San Francisco County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2013 TOTALS (lbs/day unmitigated)	18.09	32.29	26.20	0.02	12.49	1.58	14.07	2.62	1.45	4.07	5,291.41

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Urbemis 2007 Version 9.2.4

Detail Report for Summer Construction Unmitigated Emissions (Pounds/Day)

File Name: C:\Documents and Settings\cls\Application Data\Urbemis\Version9a\Projects\Cruise Terminal Phase 2 Construction.urb924

Project Name: Cruise Terminal Phase 2

Project Location: San Francisco County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Time Slice 1/2/2013-6/28/2013 Active Days: 128	4.06	**32.29**	**26.20**	0.02	**12.49**	**1.58**	**14.07**	**2.62**	**1.45**	**4.07**	**5,291.41**
Building 01/02/2013-12/31/2013	1.48	11.69	14.28	0.02	0.08	0.59	0.68	0.03	0.54	0.57	2,941.83
Building Off Road Diesel	0.95	7.29	4.48	0.00	0.00	0.43	0.43	0.00	0.39	0.39	893.39
Building Vendor Trips	0.33	4.06	3.49	0.01	0.05	0.15	0.19	0.02	0.13	0.15	1,258.21
Building Worker Trips	0.20	0.34	6.31	0.01	0.04	0.02	0.06	0.01	0.02	0.03	790.23
Fine Grading 01/02/2013-06/30/2013	2.58	20.61	11.92	0.00	12.40	0.99	13.39	2.59	0.91	3.50	2,349.57
Fine Grading Dust	0.00	0.00	0.00	0.00	12.40	0.00	12.40	2.59	0.00	2.59	0.00
Fine Grading Off Road Diesel	2.55	20.56	11.10	0.00	0.00	0.99	0.99	0.00	0.91	0.91	2,247.32
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.03	0.04	0.82	0.00	0.00	0.00	0.01	0.00	0.00	0.00	102.26

Time Slice 7/1/2013-12/31/2013 Active Days: 132	18.09	21.87	22.65	0.02	0.09	1.43	1.53	0.03	1.32	1.35	4,123.43
Asphalt 07/01/2013-12/31/2013	1.67	10.17	8.22	0.00	0.01	0.84	0.85	0.00	0.77	0.78	1,163.78
Paving Off-Gas	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	1.61	10.07	6.79	0.00	0.00	0.83	0.83	0.00	0.77	0.77	979.23
Paving On Road Diesel	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.61
Paving Worker Trips	0.04	0.08	1.43	0.00	0.01	0.00	0.01	0.00	0.00	0.01	178.95
Building 01/02/2013-12/31/2013	1.48	11.69	14.28	0.02	0.08	0.59	0.68	0.03	0.54	0.57	2,941.83
Building Off Road Diesel	0.95	7.29	4.48	0.00	0.00	0.43	0.43	0.00	0.39	0.39	893.39
Building Vendor Trips	0.33	4.06	3.49	0.01	0.05	0.15	0.19	0.02	0.13	0.15	1,258.21
Building Worker Trips	0.20	0.34	6.31	0.01	0.04	0.02	0.06	0.01	0.02	0.03	790.23
Coating 07/01/2013-12/31/2013	14.93	0.01	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.82
Architectural Coating	14.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.01	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.82

Phase Assumptions

Phase: Fine Grading 1/2/2013 - 6/30/2013 - Default Fine Site Grading Description

Total Acres Disturbed: 2.5

Maximum Daily Acreage Disturbed: 0.62

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Paving 7/1/2013 - 12/31/2013 - Default Paving Description

Acres to be Paved: 0.62

Off-Road Equipment:

4 Cement and Mortar Mixers (10 hp) operating at a 0.56 load factor for 6 hours per day

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1 Pavers (100 hp) operating at a 0.62 load factor for 7 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 7 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

Phase: Building Construction 1/2/2013 - 12/31/2013 - Default Building Construction Description

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 4 hours per day

2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

Phase: Architectural Coating 7/1/2013 - 12/31/2013 - Default Architectural Coating Description

Rule: Residential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Residential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

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Urbemis 2007 Version 9.2.4

Detail Report for Winter Construction Unmitigated Emissions (Pounds/Day)

File Name: C:\Documents and Settings\cls\Application Data\Urbemis\Version9a\Projects\Cruise Terminal Phase 2 Construction.urb924

Project Name: Cruise Terminal Phase 2

Project Location: San Francisco County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Winter Pounds Per Day, Unmitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Time Slice 1/2/2013-3/29/2013 Active Days: 63	**35.70**	**31.00**	**28.57**	**0.02**	**12.50**	**1.99**	**14.49**	**2.62**	**1.83**	**4.45**	**5,338.72**
Asphalt 01/02/2013-03/31/2013	1.68	10.20	8.23	0.00	0.01	0.84	0.85	0.00	0.77	0.78	1,169.92
Paving Off-Gas	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	1.61	10.07	6.79	0.00	0.00	0.83	0.83	0.00	0.77	0.77	979.23
Paving On Road Diesel	0.00	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.75
Paving Worker Trips	0.04	0.08	1.43	0.00	0.01	0.00	0.01	0.00	0.00	0.01	178.95
Building 01/02/2013-03/31/2013	1.48	11.69	14.28	0.02	0.08	0.59	0.68	0.03	0.54	0.57	2,941.83
Building Off Road Diesel	0.95	7.29	4.48	0.00	0.00	0.43	0.43	0.00	0.39	0.39	893.39
Building Vendor Trips	0.33	4.06	3.49	0.01	0.05	0.15	0.19	0.02	0.13	0.15	1,258.21
Building Worker Trips	0.20	0.34	6.31	0.01	0.04	0.02	0.06	0.01	0.02	0.03	790.23
Coating 01/02/2013-03/31/2013	31.29	0.02	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.33
Architectural Coating	31.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.01	0.02	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.33
Fine Grading 01/02/2013-03/31/2013	1.24	9.10	5.76	0.00	12.40	0.56	12.96	2.59	0.51	3.10	1,189.64
Fine Grading Dust	0.00	0.00	0.00	0.00	12.40	0.00	12.40	2.59	0.00	2.59	0.00
Fine Grading Off Road Diesel	1.22	9.07	5.15	0.00	0.00	0.55	0.55	0.00	0.51	0.51	1,112.94
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.02	0.03	0.61	0.00	0.00	0.00	0.01	0.00	0.00	0.00	76.69

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Phase Assumptions

Phase: Fine Grading 1/2/2013 - 3/31/2013 - Default Fine Site Grading Description

Total Acres Disturbed: 2.5

Maximum Daily Acreage Disturbed: 0.62

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

2 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Paving 1/2/2013 - 3/31/2013 - Default Paving Description

Acres to be Paved: 0.62

Off-Road Equipment:

4 Cement and Mortar Mixers (10 hp) operating at a 0.56 load factor for 6 hours per day

1 Pavers (100 hp) operating at a 0.62 load factor for 7 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 7 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

Phase: Building Construction 1/2/2013 - 3/31/2013 - Default Building Construction Description

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 4 hours per day

2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

Phase: Architectural Coating 1/2/2013 - 3/31/2013 - Default Architectural Coating Description

Rule: Residential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Residential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Table X-X. 2012 Emission Factors for AC34 Race Operation

Activities/ Components	HP / Truck Type	Fuel Type	Source of EF [1]	EF Unit	ROGexh-D	ROGexh-G	ROGevp	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2	CH4	N2O
On-Water Sources																		
spect_boats - main	1000	D	BPC	g/hp-hr	1.10	0.00	0.00	3.51	13.82	N/A [3]	0.55	0.55	0.53	0.00	0.00	0.00	0.00	0.00
spect_boats - aux	94	D	BPC	g/hp-hr	2.01	0.00	0.00	5.44	13.16	N/A [3]	0.68	0.68	0.66	0.00	0.00	0.00	0.00	0.00
race_vessels	300	G	OFFROAD	g/hp-hr	0.00	62.57	N/A [2]	135.69	7.09	0.02	10.65	0.00	9.80	0.00	0.00	1129.87	3.89	0.23
assist_tug - main	1500	D	BPC	g/hp-hr	1.24	0.00	0.00	3.72	14.22	N/A [3]	0.59	0.59	0.57	0.00	0.00	0.00	0.00	0.00
assist_tug - aux	111	D	BPC	g/hp-hr	2.10	0.00	0.00	5.59	13.47	N/A [3]	0.72	0.72	0.70	0.00	0.00	0.00	0.00	0.00
assist_tug_alcatraz - main	1500	D	BPC	g/hp-hr	1.24	0.00	0.00	3.72	14.22	N/A [3]	0.59	0.59	0.57	0.00	0.00	0.00	0.00	0.00
assist_tug_alcatraz - aux	111	D	BPC	g/hp-hr	2.10	0.00	0.00	5.59	13.47	N/A [3]	0.72	0.72	0.70	0.00	0.00	0.00	0.00	0.00
priv_smvessels - Gas	101	G	OFFROAD	g/hp-hr	0.00	51.80	N/A [2]	148.44	7.36	0.02	8.34	0.00	7.67	0.00	0.00	1167.59	3.21	0.42
priv_smvessels - Dsl	244	D	OFFROAD	g/hp-hr	8.96	0.00	0.00	11.75	26.74	0.02	0.68	0.66	0.62	0.00	0.00	1420.75	0.71	0.00
priv_lgvessels - main	3300	D	BPC	g/hp-hr	1.10	0.00	0.00	3.51	13.82	N/A [3]	0.55	0.55	0.53	0.00	0.00	0.00	0.00	0.00
priv_lgvessels - aux	94	D	BPC	g/hp-hr	2.01	0.00	0.00	5.44	13.16	N/A [3]	0.68	0.68	0.66	0.00	0.00	0.00	0.00	0.00
Off-Road Equipment																		
Generator 60kw/500A	105	D	OFFROAD	g/hp-hr	1.02	0.00	0.00	3.60	5.85	0.01	0.46	0.46	0.42	0.00	0.00	568.30	0.08	0.00
Generator-144KW/1200 AMps	252	D	OFFROAD	g/hp-hr	0.38	0.00	0.00	1.28	4.32	0.01	0.13	0.13	0.12	0.00	0.00	568.30	0.03	0.00
Generator Twin Pack400Twin	1072	D	OFFROAD	g/hp-hr	0.39	0.00	0.00	1.28	4.44	0.01	0.13	0.13	0.12	0.00	0.00	568.30	0.03	0.00
19' Scissor Lift [4]	N/A	E	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
32' scissor lift [4]	N/A	E	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
43' Scissor Lift [4]	N/A	E	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
60' Boomlift	83	D	OFFROAD	g/hp-hr	1.04	0.00	0.00	3.99	5.45	0.01	0.50	0.50	0.46	0.00	0.00	568.30	0.08	0.00
5k Warehouse (forklift)	41	D	OFFROAD	g/hp-hr	2.31	0.00	0.00	6.48	5.75	0.01	0.52	0.52	0.48	0.00	0.00	568.30	0.18	0.00
10k Reach forklift	99	D	OFFROAD	g/hp-hr	1.04	0.00	0.00	3.99	5.45	0.01	0.50	0.50	0.46	0.00	0.00	568.30	0.08	0.00
Event 4000w Light Tower	12	D	OFFROAD	g/hp-hr	1.02	0.00	0.00	3.87	5.87	0.01	0.34	0.34	0.31	0.00	0.00	568.30	0.08	0.00
boat_lifts	200	D	OFFROAD	g/hp-hr	0.66	0.00	0.00	1.57	5.43	0.01	0.20	0.20	0.18	0.00	0.00	568.30	0.05	0.00
On-Road Trucks																		
6' Gas Flatbed - idle	LHD2	G	EMFAC	g/hr	0.00	21.85	0.00	138.68	1.48	0.05	0.00	0.00	0.00	0.00	0.00	4776.90	0.00	0.00
6' Gas Flatbed - 5mph	LHD2	G	EMFAC	g/mi	0.00	1.19	1.28	12.70	0.62	0.02	0.05	0.00	0.04	0.00	0.01	2513.51	0.00	0.00
Pickup Truck - idle	LHD2	G	EMFAC	g/hr	0.00	21.85	0.00	138.68	1.48	0.05	0.00	0.00	0.00	0.00	0.00	4776.90	0.00	0.00
Pickup Truck - 5mph	LHD2	G	EMFAC	g/mi	0.00	1.19	1.28	12.70	0.62	0.02	0.05	0.00	0.04	0.00	0.01	2513.51	0.00	0.00
26' Bobtail Truck - idle	HHD	D	EMFAC	g/hr	11.46	0.00	0.00	49.27	112.64	0.06	1.50	1.50	1.38	0.00	0.00	6541.72	0.00	0.00
26' Bobtail Truck - 5mph	HHD	D	EMFAC	g/mi	8.61	0.00	0.00	14.10	30.55	0.04	1.76	1.76	1.62	0.01	0.01	3845.36	0.00	0.00
On-Road Spectator Traffic																		
Private Auto	LDA	G	EMFAC	g/mi	0.00	0.06	0.03	1.88	0.19	0.00	0.01	0.00	0.01	0.00	0.01	371.03	0.00	0.00

Notes:

1. BPC: San Francisco Bay Area Seaports Air Emissions Inventory, 2005; OFFROAD: ARB OFFROAD 2007 Model; EMFAC: ARB EMFAC v2.3 Model
2. Evaporative ROG emissions from gasoline-powered vessels are estimated by the OFFROAD model
3. SOx emissions for diesel marine sources are calculated based on fuel consumption
4. Emissions from off-road equipment powered by electricity are not quantified in this analysis

Table X-X. 2013 Emission Factors for AC34 Race Operation

Activities/ Components	HP / Truck Type	Fuel Type	Source of EF [1]	EF Unit	ROGexh-D	ROGexh-G	ROGevp	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2	CH4	N2O
On-Water Sources																		
spect_boats - main	1000	D	BPC	g/hp-hr	1.10	0.00	0.00	3.51	13.82	N/A [3]	0.55	0.55	0.53	0.00	0.00	0.00	0.00	0.00
spect_boats - aux	94	D	BPC	g/hp-hr	2.01	0.00	0.00	5.44	13.16	N/A [3]	0.68	0.68	0.66	0.00	0.00	0.00	0.00	0.00
race_vessels	300	G	OFFROAD	g/hp-hr	0.00	59.15	N/A [2]	128.46	7.13	0.02	10.65	0.00	9.80	0.00	0.00	1129.87	3.68	0.24
assist_tug - main	1500	D	BPC	g/hp-hr	1.24	0.00	0.00	3.72	14.22	N/A [3]	0.59	0.59	0.57	0.00	0.00	0.00	0.00	0.00
assist_tug - aux	111	D	BPC	g/hp-hr	2.10	0.00	0.00	5.59	13.47	N/A [3]	0.72	0.72	0.70	0.00	0.00	0.00	0.00	0.00
assist_tug_alcatraz - main	1500	D	BPC	g/hp-hr	1.24	0.00	0.00	3.72	14.22	N/A [3]	0.59	0.59	0.57	0.00	0.00	0.00	0.00	0.00
assist_tug_alcatraz - aux	111	D	BPC	g/hp-hr	2.10	0.00	0.00	5.59	13.47	N/A [3]	0.72	0.72	0.70	0.00	0.00	0.00	0.00	0.00
priv_smvessels - Gas	101	G	OFFROAD	g/hp-hr	0.00	48.02	N/A [2]	141.22	7.27	0.02	8.48	0.00	7.80	0.00	0.00	1185.10	2.98	0.42
priv_smvessels - Dsl	244	D	OFFROAD	g/hp-hr	8.96	0.00	0.00	11.75	26.74	0.02	0.68	0.66	0.63	0.00	0.00	1420.75	0.71	0.00
priv_lgvessels - main	3300	D	BPC	g/hp-hr	1.10	0.00	0.00	3.51	13.82	N/A [3]	0.55	0.55	0.53	0.00	0.00	0.00	0.00	0.00
priv_lgvessels - aux	94	D	BPC	g/hp-hr	2.01	0.00	0.00	5.44	13.16	N/A [3]	0.68	0.68	0.66	0.00	0.00	0.00	0.00	0.00
Off-Road Equipment																		
Generator 60kw/500A	105	D	OFFROAD	g/hp-hr	0.93	0.00	0.00	3.57	5.48	0.01	0.42	0.42	0.39	0.00	0.00	568.30	0.07	0.00
Generator-144KW/1200 AMps	252	D	OFFROAD	g/hp-hr	0.36	0.00	0.00	1.21	3.99	0.01	0.11	0.11	0.11	0.00	0.00	568.30	0.03	0.00
Generator Twin Pack400Twin	1072	D	OFFROAD	g/hp-hr	0.37	0.00	0.00	1.21	4.11	0.01	0.12	0.12	0.11	0.00	0.00	568.30	0.03	0.00
19' Scissor Lift [4]	N/A	E	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
32' scissor lift [4]	N/A	E	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
43' Scissor Lift [4]	N/A	E	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
60' Boomlift	83	D	OFFROAD	g/hp-hr	0.93	0.00	0.00	3.95	5.04	0.01	0.43	0.43	0.40	0.00	0.00	568.30	0.07	0.00
5k Warehouse (forklift)	41	D	OFFROAD	g/hp-hr	2.00	0.00	0.00	6.25	5.53	0.01	0.46	0.46	0.43	0.00	0.00	568.30	0.15	0.00
10k Reach forklift	99	D	OFFROAD	g/hp-hr	0.93	0.00	0.00	3.95	5.04	0.01	0.43	0.43	0.40	0.00	0.00	568.30	0.07	0.00
Event 4000w Light Tower	12	D	OFFROAD	g/hp-hr	0.97	0.00	0.00	3.80	5.62	0.01	0.32	0.32	0.29	0.00	0.00	568.30	0.07	0.00
boat_lifts	200	D	OFFROAD	g/hp-hr	0.62	0.00	0.00	1.49	5.04	0.01	0.18	0.18	0.16	0.00	0.00	568.30	0.05	0.00
On-Road Trucks																		
6' Gas Flatbed - idle	LHD2	G	EMFAC	g/hr	0.00	21.73	0.00	137.87	1.46	0.05	0.00	0.00	0.00	0.00	0.00	4776.90	0.00	0.00
6' Gas Flatbed - 5mph	LHD2	G	EMFAC	g/mi	0.00	1.04	1.20	11.05	0.56	0.02	0.05	0.00	0.04	0.00	0.01	2513.51	0.00	0.00
Pickup Truck - idle	LHD2	G	EMFAC	g/hr	0.00	21.73	0.00	137.87	1.46	0.05	0.00	0.00	0.00	0.00	0.00	4776.90	0.00	0.00
Pickup Truck - 5mph	LHD2	G	EMFAC	g/mi	0.00	1.04	1.20	11.05	0.56	0.02	0.05	0.00	0.04	0.00	0.01	2513.51	0.00	0.00
26' Bobtail Truck - idle	HHD	D	EMFAC	g/hr	10.96	0.00	0.00	48.55	113.98	0.06	1.35	1.35	1.24	0.00	0.00	6541.71	0.00	0.00
26' Bobtail Truck - 5mph	HHD	D	EMFAC	g/mi	7.81	0.00	0.00	12.93	27.24	0.04	1.50	1.50	1.38	0.01	0.01	3845.36	0.00	0.00
On-Road Spectator Traffic																		
Private Auto	LDA	G	EMFAC	g/mi	0.00	0.04	0.03	1.60	0.16	0.00	0.01	0.00	0.01	0.00	0.01	369.93	0.00	0.00

Notes:

1. BPC: San Francisco Bay Area Seaports Air Emissions Inventory, 2005; OFFROAD: ARB OFFROAD 2007 Model; EMFAC: ARB EMFAC v2.3 Model
2. Evaporative ROG emissions from gasoline-powered vessels are estimated by the OFFROAD model
3. SOx emissions for diesel marine sources are calculated based on fuel consumption
4. Emissions from off-road equipment powered by electricity are not quantified in this analysis

On-Water Sources

Table X-X. 2012 AC34 On-Water Source Activity Data Summary

Location	Activity/Component	HP	LF	Fuel Type	Hours/Day/ Unit	# Days	# Units
AC Village: Marina Green	spect_boats - main	1000	42%	D	6	20	7
	spect_boats - aux	94	43%	D	6	20	7
	race_vessels	300	21%	G	6	20	10
Alcatraz	assist_tug_alcatraz - main	1500	50%	D	1	2	3
	assist_tug_alcatraz - aux	111	31%	D	1	2	3
Barge Helipad & Regional Airports	assist_tug - main	1500	50%	D	1	2	1
	assist_tug - aux	111	31%	D	1	2	1
Fort Mason	race_vessels	300	21%	G	6	20	5
Pier 30-32	race_vessels	300	21%	G	6	20	50
Pier 80	race_vessels	300	21%	G	6	20	5
Spectator Boats	priv_smvessels - Gas	101	20%	G	4	20	863
	priv_smvessels - Dsl	244	14%	D	4	20	10

Table X-X. 2013 AC34 On-Water Source Activity Data Summary

Location	Activity/Component	HP	LF	Fuel Type	Hours/Day/ Unit	# Days	# Units
Alcatraz	assist_tug_alcatraz - main	1500	50%	D	1	2	3
	assist_tug_alcatraz - aux	111	31%	D	1	2	3
Barge Helipad & Regional Airports	assist_tug - main	1500	50%	D	1	2	1
	assist_tug - aux	111	31%	D	1	2	1
Fort Mason	race_vessels	300	21%	G	6	50	5
Pier 19 and 19½	race_vessels	300	21%	G	6	50	20
Pier 23	spect_boats - main	1000	42%	D	6	50	2
	spect_boats - aux	94	43%	D	6	50	2
	race_vessels	300	21%	G	6	50	30
Pier 30-32	race_vessels	300	21%	G	6	50	40
Pier 80	race_vessels	300	21%	G	6	50	5
Piers 27-29 and Pier 29½	spect_boats - main	1000	42%	D	6	50	3
	spect_boats - aux	94	43%	D	6	50	3
	race_vessels	300	21%	G	6	50	5
Spectator Boats	priv_smvessels - Gas	101	20%	G	4	50	883
	priv_smvessels - Dsl	244	14%	D	4	50	13

In-Air Sources

Table X-X. 2012 AC34 In-Air Sources Activity Data Summary

Location	Activity/Component	HP	Fuel Type	Hours/Day/ Unit	# Days	# Units
Barge Helipad & Regional Airports	helicopter	400	Jet	6	20	2
	helicopter	320	G	6	20	1

Table X-X. 2013 AC34 In-Air Sources Activity Data Summary

Location	Activity/Component	HP	Fuel Type	Hours/Day/ Unit	# Days	# Units
Barge Helipad & Regional Airports	helicopter	400	Jet	6	50	2
	helicopter	320	G	6	50	1

Off-Road Sources

Table X-X. 2012 AC34 Off-Road Sources Activity Data Summary

Location	Activity/Component	HP	LF	Hours/Day/Unit	Fuel Type	# Days	# Units
AC Village: Marina Green	Generator 60kw/500A	105	50%	10	D	18	1
	Generator Twin Pack400Twin	1072	50%	10	D	18	2
	32' scissor lift	0	0%	0	E	12	1
	5k Warehouse (forklift)	41	20%	2	D	12	3
	10k Reach forklift	99	20%	2	D	10	1
	Event 4000w Light Tower	12	50%	2	D	44	2
AC34 Live Sites	Generator 60kw/500A	105	50%	10	D	1	1
	Generator-144KW/1200 AMps	252	50%	10	D	18	1
	Generator Twin Pack400Twin	1072	50%	10	D	18	1
Alcatraz	Generator 60kw/500A	105	50%	10	D	2	1
	Generator Twin Pack400Twin	1072	50%	10	D	2	1
	19' Scissor Lift	0	0%	0	E	18	1
	5k Warehouse (forklift)	41	20%	2	D	18	2
	10k Reach forklift	99	20%	2	D	18	1
	Event 4000w Light Tower	12	50%	2	D	18	2
Cavallo Point	Generator 60kw/500A	105	50%	10	D	18	1
	Generator Twin Pack400Twin	1072	50%	10	D	18	2
	32' scissor lift	0	0%	0	E	12	1
	5k Warehouse (forklift)	41	20%	2	D	12	3
	10k Reach forklift	99	20%	2	D	10	1
	Event 4000w Light Tower	12	50%	2	D	38	2
Crissy Field	Generator 60kw/500A	105	50%	10	D	1	1
	Generator-144KW/1200 AMps	252	50%	10	D	18	1
	Generator Twin Pack400Twin	1072	50%	10	D	18	1
	19' Scissor Lift	0	0%	0	E	12	2
	60' Boomlift	83	20%	2	D	10	1
	5k Warehouse (forklift)	41	20%	2	D	12	2
	10k Reach forklift	99	20%	2	D	12	2
	Event 4000w Light Tower	12	50%	2	D	44	2
Fort Mason	Generator 60kw/500A	105	50%	10	D	1	1
	Generator-144KW/1200 AMps	252	50%	10	D	18	1
	Generator Twin Pack400Twin	1072	50%	10	D	18	1
	19' Scissor Lift	0	0%	0	E	15	2
	32' scissor lift	0	0%	0	E	15	2
	5k Warehouse (forklift)	41	20%	2	D	12	2
Pier 30-32	boat_lifts	200	29%	24	D	80	2
Pier 32-36 Open Water Basin	boat_lifts	200	29%	24	D	80	2
Pier 80	boat_lifts	200	29%	24	D	80	2

Off-Road Sources

Table X-X. 2013 AC34 Off-Road Sources Activity Data Summary

Location	Activity/Component	HP	LF	Hours/Day/ Unit	Fuel Type	# Days	# Units
AC Village: Marina Green	Generator 60kw/500A	105	50%	10	D	21	1
	Generator-144KW/1200 AMps	252	50%	10	D	50	2
	Generator Twin Pack400Twin	1072	50%	10	D	50	2
	32' scissor lift	0	0%	0	E	18	1
	5k Warehouse (forklift)	41	20%	2	D	25	3
	10k Reach forklift	99	20%	2	D	21	1
	Event 4000w Light Tower	12	50%	2	D	71	2
AC34 Live Sites	Generator-144KW/1200 AMps	252	50%	10	D	50	2
Alcatraz	Generator 60kw/500A	105	50%	10	D	26	1
	Generator Twin Pack400Twin	1072	50%	10	D	26	1
	19' Scissor Lift	0	0%	0	E	18	1
	5k Warehouse (forklift)	41	20%	2	D	18	2
	10k Reach forklift	99	20%	2	D	18	1
	Event 4000w Light Tower	12	50%	2	D	26	2
Cavallo Point	Generator 60kw/500A	105	50%	10	D	50	1
	Generator Twin Pack400Twin	1072	50%	10	D	50	2
	32' scissor lift	0	0%	0	E	12	1
	5k Warehouse (forklift)	41	20%	2	D	12	3
	10k Reach forklift	99	20%	2	D	12	1
	Event 4000w Light Tower	12	50%	2	D	62	2
Crissy Field	Generator-144KW/1200 AMps	252	50%	10	D	50	2
	19' Scissor Lift	0	0%	0	E	21	2
	60' Boomlift	83	20%	2	D	21	1
	5k Warehouse (forklift)	41	20%	2	D	21	2
	10k Reach forklift	99	20%	2	D	21	2
	Event 4000w Light Tower	12	50%	2	D	71	2
Fort Mason	Generator-144KW/1200 AMps	252	50%	10	D	50	2
	19' Scissor Lift	0	0%	0	E	18	2
	32' scissor lift	0	0%	0	E	18	2
	5k Warehouse (forklift)	41	20%	2	D	18	2
Pier 19 and 19½	Generator-144KW/1200 AMps	252	50%	10	D	50	2
	Generator Twin Pack400Twin	1072	50%	10	D	50	2
	32' scissor lift	0	0%	0	E	81	2
	43' Scissor Lift	0	0%	0	E	81	2
	5k Warehouse (forklift)	41	20%	2	D	81	2
	10k Reach forklift	99	20%	2	D	81	1
Pier 23	Generator-144KW/1200 AMps	252	50%	10	D	50	2
	Generator Twin Pack400Twin	1072	50%	10	D	50	2
	32' scissor lift	0	0%	0	E	81	2
	43' Scissor Lift	0	0%	0	E	81	2
	5k Warehouse (forklift)	41	20%	2	D	81	2
	10k Reach forklift	99	20%	2	D	81	1

Off-Road Sources

	Generator 60kw/500A	105	50%	10	D	50	1
	Generator-144KW/1200 AMps	252	50%	10	D	50	1
	Generator Twin Pack400Twin	1072	50%	10	D	50	2
	19' Scissor Lift	0	0%	0	E	81	2
Pier 30-32	32' scissor lift	0	0%	0	E	81	2
	43' Scissor Lift	0	0%	0	E	81	2
	60' Boomlift	83	20%	2	D	81	1
	5k Warehouse (forklift)	41	20%	2	D	81	8
	10k Reach forklift	99	20%	2	D	81	4
	Event 4000w Light Tower	12	50%	2	D	131	4
	boat_lifts	200	29%	24	D	90	3
Pier 80	boat_lifts	200	29%	24	D	90	3
	Generator-144KW/1200 AMps	252	50%	10	D	50	6
	Generator Twin Pack400Twin	1072	50%	10	D	50	6
	19' Scissor Lift	0	0%	0	E	81	2
Piers 27-29 and Pier 29½	32' scissor lift	0	0%	0	E	81	2
	43' Scissor Lift	0	0%	0	E	81	2
	60' Boomlift	83	20%	2	D	81	1
	5k Warehouse (forklift)	41	20%	2	D	81	5
	10k Reach forklift	99	20%	2	D	81	1
	Event 4000w Light Tower	12	50%	2	D	131	2

On-Road Trucks

Table X-X. 2012 AC34 On-Road Sources Activity Data Summary

Location	Activity/Component	HP	Fuel Type	Hours/Trip	Miles/Trip	# Days	# Trips
	6' Gas Flatbed - idle	12	G	0.17	N/A	30	2
	6' Gas Flatbed - 5mph	12	G	N/A	0.25	30	2
	26' Bobtail Truck - idle	450	D	0.17	N/A	1	300
AC Village: Marina Green	26' Bobtail Truck - 5mph	450	D	N/A	0.25	1	300
	6' Gas Flatbed - idle	12	G	0.17	N/A	18	3
	6' Gas Flatbed - 5mph	12	G	N/A	0.25	18	3
	Pickup Truck - idle	250	G	0.17	N/A	18	2
	Pickup Truck - 5mph	250	G	N/A	0.25	18	2
	26' Bobtail Truck - idle	450	D	0.17	N/A	18	10
Alcatraz	26' Bobtail Truck - 5mph	450	D	N/A	0.25	18	10
	6' Gas Flatbed - idle	12	G	0.17	N/A	30	2
	6' Gas Flatbed - 5mph	12	G	N/A	0.25	30	2
	26' Bobtail Truck - idle	450	D	0.17	N/A	1	300
Cavallo Point	26' Bobtail Truck - 5mph	450	D	N/A	0.25	1	300
	6' Gas Flatbed - idle	12	G	0.17	N/A	30	2
	6' Gas Flatbed - 5mph	12	G	N/A	0.25	30	2
	Pickup Truck - idle	250	G	0.17	N/A	30	2
	Pickup Truck - 5mph	250	G	N/A	0.25	30	2
	26' Bobtail Truck - idle	450	D	0.17	N/A	1	300
Crissy Field	26' Bobtail Truck - 5mph	450	D	N/A	0.25	1	300
	6' Gas Flatbed - idle	12	G	0.17	N/A	30	1
	6' Gas Flatbed - 5mph	12	G	N/A	0.25	30	1
	26' Bobtail Truck - idle	450	D	0.17	N/A	1	75
Fort Mason	26' Bobtail Truck - 5mph	450	D	N/A	0.25	1	75

Off-Road Sources

Table X-X. 2013 AC34 On-Road Sources Activity Data Summary

Location	Activity/Component	HP	Fuel Type	Hours/Trip	Miles/Trip	# Days	# Trips
AC Village: Marina Green	6' Gas Flatbed - idle	12	G	0.17	N/A	71	2
	6' Gas Flatbed - 5mph	12	G	N/A	0.25	71	2
	26' Bobtail Truck - idle	450	D	0.17	N/A	1	500
	26' Bobtail Truck - 5mph	450	D	N/A	0.25	1	500
Alcatraz	6' Gas Flatbed - idle	12	G	0.17	N/A	18	3
	6' Gas Flatbed - 5mph	12	G	N/A	0.25	18	3
	Pickup Truck - idle	250	G	0.17	N/A	18	2
	Pickup Truck - 5mph	250	G	N/A	0.25	18	2
	26' Bobtail Truck - idle	450	D	0.17	N/A	1	200
	26' Bobtail Truck - 5mph	450	D	N/A	0.25	1	200
Cavallo Point	6' Gas Flatbed - idle	12	G	0.17	N/A	12	2
	6' Gas Flatbed - 5mph	12	G	N/A	0.25	12	2
	26' Bobtail Truck - idle	450	D	0.17	N/A	1	300
	26' Bobtail Truck - 5mph	450	D	N/A	0.25	1	300
Crissy Field	6' Gas Flatbed - idle	12	G	0.17	N/A	21	2
	6' Gas Flatbed - 5mph	12	G	N/A	0.25	21	2
	Pickup Truck - idle	250	G	0.17	N/A	21	2
	Pickup Truck - 5mph	250	G	N/A	0.25	21	2
	26' Bobtail Truck - idle	450	D	0.17	N/A	1	500
	26' Bobtail Truck - 5mph	450	D	N/A	0.25	1	500
Fort Mason	6' Gas Flatbed - idle	12	G	0.17	N/A	18	1
	6' Gas Flatbed - 5mph	12	G	N/A	0.25	18	1
	26' Bobtail Truck - idle	450	D	0.17	N/A	1	150
	26' Bobtail Truck - 5mph	450	D	N/A	0.25	1	150
Pier 19 and 19½	6' Gas Flatbed - idle	12	G	0.17	N/A	81	4
	6' Gas Flatbed - 5mph	12	G	N/A	0.25	81	4
	26' Bobtail Truck - idle	450	D	0.17	N/A	1	300
	26' Bobtail Truck - 5mph	450	D	N/A	0.25	1	300
Pier 23	6' Gas Flatbed - idle	12	G	0.17	N/A	81	4
	6' Gas Flatbed - 5mph	12	G	N/A	0.25	81	4
	26' Bobtail Truck - idle	450	D	0.17	N/A	1	300
	26' Bobtail Truck - 5mph	450	D	N/A	0.25	1	300
Pier 30-32	6' Gas Flatbed - idle	12	G	0.17	N/A	81	8
	6' Gas Flatbed - 5mph	12	G	N/A	0.25	81	8
	26' Bobtail Truck - idle	450	D	0.17	N/A	1	600
	26' Bobtail Truck - 5mph	450	D	N/A	0.25	1	600
Piers 27-29 and Pier 29½	6' Gas Flatbed - idle	12	G	0.17	N/A	81	3
	6' Gas Flatbed - 5mph	12	G	N/A	0.25	81	3
	26' Bobtail Truck - idle	450	D	0.17	N/A	1	600
	26' Bobtail Truck - 5mph	450	D	N/A	0.25	1	600

On-Road Spectator Traffic

Table X-X. 2012 AC34 On-Road Spectator Traffic Activity Data Summary

Location	Activity/Component	Fuel Type	Miles/Trip	# Days	Trips/Day
San Francisco Origin	Light Duty Passenger Cars	G	5	20	1,995
East Bay Origin	Light Duty Passenger Cars	G	11.5	20	9,452
North Bay Origin	Light Duty Passenger Cars	G	54.2	20	5,864
South Bay Origin	Light Duty Passenger Cars	G	50	20	10,165
Out of Region Origin	Light Duty Passenger Cars	G	62.4	20	1,282

Table X-X. 2013 AC34 On-Road Spectator Traffic Activity Data Summary

Location	Activity/Component	Fuel Type	Miles/Trip	# Days	Trips/Day
San Francisco Origin	Light Duty Passenger Cars	G	5	50	2,132
East Bay Origin	Light Duty Passenger Cars	G	11.5	50	10,051
North Bay Origin	Light Duty Passenger Cars	G	54.2	50	6,451
South Bay Origin	Light Duty Passenger Cars	G	50	50	10,846
Out of Region Origin	Light Duty Passenger Cars	G	62.4	50	1,325

In-Air Sources

Table X-X. 2012 AC34 Operation In-Air Sources Emissions [lb/yr]

Location	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2	CH4	N2O
Barge Helipad& Regional Airports	556	21,936	400.63	95.93	0.00	0.00	0.00	0.00	0.00	234,258	0.00	0.00

Table X-X. 2013 AC34 Operation In-Air Sources Emissions [lb/yr]

Location	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2	CH4	N2O
Barge Helipad& Regional Airports	1,384	54,674	998.92	239.04	0.00	0.00	0.00	0.00	0.00	583,726	0.00	0.00

Cruise Terminal Auxiliary Engine Operation Emissions due to Lack of Shore Side Power

Table X-X. 2012 AC34 Operation No Shore Power Emissions [lb/yr]

Location	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2	CH4	N2O
Piers 27-29 Cruise Terminal	1,580	3,324	41,754	1,441	797	773	731	0	0	3,506,984	279	0

Table X-X. 2013 AC34 Operation No Shore Power Emissions [lb/yr]

Location	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2	CH4	N2O
Piers 27-29 Cruise Terminal	1,580	3,324	41,754	1,441	797	773	731	0	0	3,506,984	279	0

Off-Road Equipment

Table X-X. 2012 AC34 Operation Off-Road Equipment Emissions [lb/yr]

Location	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2	CH4	N2O
AC Village	193.78	633	2,020	2.58	65.42	65.42	60.19	0.00	0.00	254,050	14.87	0.00
AC34 Live Sites	103.33	336	1,158	1.49	33.77	33.77	31.07	0.00	0.00	148,709	7.93	0.00
Alcatraz	17.20	57	139	0.18	5.85	5.85	5.38	0.00	0.00	16,802	1.32	0.00
Cavallo Point	193.46	632	2,019	2.58	65.32	65.32	60.09	0.00	0.00	253,871	14.84	0.00
Crissy Field	110.64	362	1,192	1.54	36.43	36.43	33.51	0.00	0.00	152,132	8.49	0.00
Fort Mason	105.35	342	1,163	1.50	34.23	34.23	31.49	0.00	0.00	149,205	8.08	0.00
Pier 30-32	320.68	767	2,648	3.12	95.99	95.99	88.31	0.00	0.00	277,247	24.60	0.00
Pier 32-36 Open Water Basin	320.68	767	2,648	3.12	95.99	95.99	88.31	0.00	0.00	277,247	24.60	0.00
Pier80	320.68	767	2,648	3.12	95.99	95.99	88.31	0.00	0.00	277,247	24.60	0.00

Table X-X. 2013 AC34 Operation Off-Road Equipment Emissions [lb/yr]

Location	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2	CH4	N2O
AC Village	562.00	1,877	6,096	8.46	182.08	182.08	167.51	0.00	0.00	840,952	43.11	0.00
AC34 Live Sites	97.92	334	1,099	1.54	31.63	31.63	29.10	0.00	0.00	156,556	7.51	0.00
Alcatraz	145.25	495	1,440	1.97	50.00	50.00	46.00	0.00	0.00	192,532	11.14	0.00
Cavallo Point	491.10	1,649	5,165	7.12	163.42	163.42	150.35	0.00	0.00	701,790	37.67	0.00
Crissy Field	109.43	378	1,155	1.62	35.79	35.79	32.93	0.00	0.00	162,513	8.39	0.00
Fort Mason	100.53	342	1,106	1.55	32.23	32.23	29.66	0.00	0.00	157,299	7.71	0.00
Pier 19 and 19½	547.12	1,818	5,987	8.32	174.42	174.42	160.47	0.00	0.00	829,925	41.97	0.00
Pier 23	547.12	1,818	5,987	8.32	174.42	174.42	160.47	0.00	0.00	829,925	41.97	0.00
Pier 30-32	1,136.02	3,356	10,214	13.64	353.75	353.75	325.45	0.00	0.00	1,285,471	87.15	0.00
Pier80	510.42	1,230	4,150	5.26	146.38	146.38	134.67	0.00	0.00	467,854	39.16	0.00
Piers 27-29 and Pier 29½	1,634.46	5,429	17,943	24.95	520.51	520.51	478.87	0.00	0.00	2,487,316	125.39	0.00

On-Road Trucks

Table X-X. 2012 AC34 Operation On-Road Trucks Emissions [lb/yr]

Location	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2	CH4	N2O
AC Village	3.25	11.24	17.52	0.01	0.46	0.46	0.42	0.00	0.00	1,546	0.00	0.00
Alcatraz	2.46	9.87	10.56	0.01	0.28	0.27	0.25	0.00	0.00	1,097	0.00	0.00
Cavallo Point	3.25	11.24	17.52	0.01	0.46	0.46	0.42	0.00	0.00	1,546	0.00	0.00
Crissy Field	3.81	14.72	17.58	0.02	0.46	0.46	0.42	0.00	0.00	1,734	0.00	0.00
Fort Mason	0.95	3.68	4.39	0.00	0.11	0.11	0.11	0.00	0.00	433	0.00	0.00

Table X-X. 2013 AC34 Operation On-Road Trucks Emissions [lb/yr]

Location	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2	CH4	N2O
AC Village	5.48	20.54	28.57	0.03	0.66	0.66	0.61	0.00	0.00	2,708	0.00	0.00
Alcatraz	2.50	10.10	11.46	0.01	0.27	0.26	0.25	0.00	0.00	1,187	0.00	0.00
Cavallo Point	2.72	8.85	17.09	0.01	0.40	0.40	0.37	0.00	0.00	1,432	0.00	0.00
Crissy Field	4.94	17.25	28.52	0.02	0.66	0.66	0.61	0.00	0.00	2,526	0.00	0.00
Fort Mason	1.42	4.77	8.55	0.01	0.20	0.20	0.18	0.00	0.00	735	0.00	0.00
Pier 19 and 19½	5.49	25.88	17.34	0.02	0.40	0.40	0.37	0.00	0.00	2,375	0.00	0.00
Pier 23	5.49	25.88	17.34	0.02	0.40	0.40	0.37	0.00	0.00	2,375	0.00	0.00
Pier 30-32	10.97	51.76	34.69	0.05	0.81	0.79	0.74	0.00	0.01	4,749	0.00	0.00
Piers 27-29 and Pier 29½	7.24	28.77	34.35	0.03	0.80	0.79	0.73	0.00	0.00	3,477	0.00	0.00

On-Water Sources

Table X-X. 2012 AC34 Operation On-Water Sources Emissions [lb/yr]

Location	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2	CH4	N2O
AC Village	11649	26112	12937	8	2281	478	2122	0	0	191327	659	40
Alcatraz	13	39	147	0	6	6	6	0	0	0	0	0
Barge Helipad& Regional Airports	4	13	49	0	2	2	2	0	0	0	0	0
Fort Mason	5323	11489	601	2	902	0	830	0	0	95663	329	20
Pier 30-32	53234	114886	6006	16	9017	0	8296	0	0	956634	3293	199
Pier80	5323	11489	601	2	902	0	830	0	0	95663	329	20
Spectator Vessels	166673	464417	24689	18	26080	42	23994	0	0	3736735	10082	1326

Table X-X. 2013 AC34 Operation On-Water Sources Emissions [lb/yr]

Location	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2	CH4	N2O
Alcatraz	13	39	147	0	6	6	6	0	0	0	0	0
Barge Helipad& Regional Airports	4	13	49	0	2	2	2	0	0	0	0	0
Brannan Street Wharf	3665	11321	41233	17	1701	1701	1650	0	0	0	0	0
Fort Mason	12,881	28,099	4,794	5	2,390	136	2,206	0	0	239158.579	778.173899	50.0392806
Pier 19 and 19½	50,702	109,883	10,227	17	9,188	171	8,461	0	0	956634.315	3112.6956	200.157123
Pier 23	76,233	165,384	17,436	27	13,867	341	12,774	0	0	1434951.47	4669.0434	300.235684
Pier 26 and 28	50,344	108,763	6,035	16	9,017	0	8,296	0	0	956634.315	3112.6956	200.157123
Pier 30-32	100,689	217,527	12,070	31	18,034	0	16,591	0	0	1913268.63	6225.3912	400.314245
Pier80	12,586	27,191	1,509	4	2,254	0	2,074	0	0	239158.579	778.173899	50.0392806
Piers 27-29 and Pier 29½	19,558	48,714	79,783	35	5,486	3,232	5,209	0	0	239158.579	778.173899	50.0392806
Spectator Vessels	399,544	1,136,769	63,460	158	68,224	126	62,766	0	0	9790222.59	24062.2353	3369.88289

On-Road Spectator Traffic

Table X-X. 2012 AC34 Operation On-Road Spectator Traffic Emissions [lb/yr]

Location	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2	CH4	N2O
San Francisco	40	825	81	2	5	0	4	1	2	163,157	0	0
East Bay	437	8,992	888	17	50	0	45	10	24	1,778,304	0	0
North Bay	1,279	26,291	2,596	50	145	0	132	28	70	5,199,361	0	0
South Bay	2,045	42,044	4,151	80	233	0	210	45	112	8,314,783	0	0
Out of Region	322	6,618	653	13	37	0	33	7	18	1,308,868	0	0

Table X-X. 2013 AC34 Operation On-Road Spectator Traffic Emissions [lb/yr]

Location	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2	CH4	N2O
San Francisco	89	1,876	188	4	12	0	11	2	6	434,722	0	0
East Bay	964	20,338	2,039	46	132	0	119	25	64	4,713,564	0	0
North Bay	2,917	61,523	6,169	138	399	0	361	77	193	14,258,542	0	0
South Bay	4,524	95,418	9,567	214	618	0	560	120	299	22,114,176	0	0
Out of Region	690	14,544	1,458	33	94	0	85	18	46	3,370,804	0	0

On-Road Vehicles

Table X-X. 2011 Off-site Emission Factors for Cruise Terminal Operation

Source	Movement Emission Factors (g/mi)									
	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2
Pvt. Auto	0.15	2.17	0.21	0.00	0.01	0.00	0.01	0.00	0.01	372.26
M. Coach/Shuttle Bus	0.16	1.53	8.21	0.01	0.19	0.19	0.17	0.00	0.00	1379.58
Taxi/Limo	0.15	2.17	0.21	0.00	0.01	0.00	0.01	0.00	0.01	372.26

Note:

Emission factors are speed-weighed averages using the default speed fraction from the EMFAC model

Table X-X. 2011 On-site Emission Factors for Cruise Terminal Operation

Source	Idle Emission Factors (g/hr)									
	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2
Pvt. Auto	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M. Coach/Shuttle Bus	3.17	26.30	75.05	0.04	0.97	0.97	0.89	0.00	0.00	4098.00
Taxi/Limo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Source	**Movement Emission Factors (g/mi)**									
	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2
Pvt. Auto	0.91	4.20	0.32	0.01	0.05	0.00	0.05	0.00	0.01	952.34
M. Coach/Shuttle Bus	0.58	6.96	12.05	0.01	0.66	0.66	0.61	0.00	0.01	1505.00
Taxi/Limo	0.91	4.20	0.32	0.01	0.05	0.00	0.05	0.00	0.01	952.34

Note:

On-site movement emission factors assume traveling at the speed at 5 mph.

Table X-X. 2014 Off-site Emission Factors for Cruise Terminal Operation

Source	Movement Emission Factors (g/mi)									
	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2
Pvt. Auto	0.10	1.47	0.15	0.00	0.01	0.00	0.01	0.00	0.01	369.22
M. Coach/Shuttle Bus	0.14	1.41	6.16	0.01	0.16	0.16	0.15	0.00	0.00	1379.58
Taxi/Limo	0.10	1.47	0.15	0.00	0.01	0.00	0.01	0.00	0.01	369.22

Note:

Emission factors are speed-weighed averages using the default speed fraction from the EMFAC model

Table X-X. 2014 On-site Emission Factors for Cruise Terminal Operation

Source	Idle Emission Factors (g/hr)									
	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2
Pvt. Auto	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M. Coach/Shuttle Bus	3.17	26.30	75.05	0.04	0.91	0.91	0.84	0.00	0.00	4098.00
Taxi/Limo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Source	**Movement Emission Factors (g/mi)**									
	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2
Pvt. Auto	0.64	2.82	0.23	0.01	0.05	0.00	0.05	0.00	0.01	944.55
M. Coach/Shuttle Bus	0.51	6.40	9.04	0.01	0.57	0.57	0.52	0.00	0.01	1505.00
Taxi/Limo	0.64	2.82	0.23	0.01	0.05	0.00	0.05	0.00	0.01	944.55

Note:

On-site movement emission factors assume traveling at the speed at 5 mph.

On-Road Vehicles

Table X-X. Cruise Operating Days

Year	No. Days
2011	75
2014	75

Table X-X. 2011 Baseline and 2014 Cruise Terminal Operation Activity Data by Mode

Mode	Cruise	Retail	Res/Café	Event	Total Person-Trips	% Person-Trips [2]	Occupancy	# Trips
Pvt. Auto	6,062	37	449	503	7,052	47%	2.70	2,612
M. Coach/Shuttle Bus	2,302	0	0	0	2,302	15%	14.40	160
Transit [1]	1,444	27	408	433	2,312	15%		
Taxi/Limo	2,187	0	0	0	2,187	15%	2.43	900
Walk / Other [1]	305	38	366	444	1,152	8%		
Total	**12,300**	**102**	**1,224**	**1,380**	**15,006**	**100%**		**3,672**

Notes

1. Emissions from transit buses and walking are not quantified in this analysis
2. % trips by transportation mode applies to all origin-destination routes described in Table x-x below.

Table X-X. 2011 Baseline and 2014 Cruise Terminal Operation Activity Data by Location

Origin-Destination	On-site Idling Time (hr)	On-Site Distance (mi)	Off-site Distance (mi)	Total Daily Person-Trips	Trips		
					Pvt. Auto	M. Coach / Shuttle Bus	Taxi/Limo
Superdistrict 1	0.17	0.25	2.3	3163	551	34	190
Superdistrict 2	0.17	0.25	4.6	2102	366	22	126
Superdistrict 3	0.17	0.25	6.4	2006	349	21	120
Superdistrict 4	0.17	0.25	11.2	1110	193	12	67
East Bay	0.17	0.25	11.5	1819	317	19	109
North Bay	0.17	0.25	54.2	767	133	8	46
South Bay	0.17	0.25	50.0	1159	202	12	70
Out of Region	0.17	0.25	62.4	2880	501	31	173
Total				**15006**	**2612**	**160**	**900**

On-Road Vehicles

Table X-X. 2011 Baseline Off-Site Cruise Terminal Operations Emissions Data (tons/yr)

[short tons]	ROG	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Pvt. Auto	0.76	10.70	1.05	0.02	0.05	0.00	0.05	0.01	0.02	1,834
M. Coach/Shuttle Bus	0.05	0.46	2.48	0.00	0.06	0.06	0.05	0.00	0.00	416
Taxi/Limo	0.26	3.69	0.36	0.01	0.02	0.00	0.02	0.00	0.01	632
Total	**1.07**	**14.85**	**3.89**	**0.03**	**0.13**	**0.06**	**0.11**	**0.01**	**0.03**	**2,882**

Table X-X. 2011 Baseline On-Site Cruise Terminal Operations Emissions Data (tons/yr)

[short tons]	ROG	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Pvt. Auto	0.05	0.23	0.02	0.00	0.00	0.00	0.00	0.00	0.00	51
M. Coach/Shuttle Bus	0.01	0.08	0.21	0.00	0.00	0.00	0.00	0.00	0.00	14
Taxi/Limo	0.02	0.08	0.01	0.00	0.00	0.00	0.00	0.00	0.00	18
TOTALS	**0.08**	**0.39**	**0.23**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**83**

Table X-X. 2014 Off-Site Cruise Terminal Operations Emissions Data (tons/yr)

[short tons]	ROG	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Pvt. Auto	0.50	7.26	0.72	0.02	0.05	0.00	0.05	0.01	0.02	1,819
M. Coach/Shuttle Bus	0.04	0.42	1.86	0.00	0.05	0.05	0.04	0.00	0.00	416
Taxi/Limo	0.17	2.50	0.25	0.01	0.02	0.00	0.02	0.00	0.01	627
Total	**0.71**	**10.18**	**2.82**	**0.03**	**0.12**	**0.05**	**0.11**	**0.01**	**0.03**	**2,862**

Table X-X. 2014 On-Site Cruise Terminal Operations Emissions Data (tons/yr)

[short tons]	ROG	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
Pvt. Auto	0.03	0.15	0.01	0.00	0.00	0.00	0.00	0.00	0.00	51
M. Coach/Shuttle Bus	0.01	0.08	0.20	0.00	0.00	0.00	0.00	0.00	0.00	14
Taxi/Limo	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18
TOTALS	**0.05**	**0.28**	**0.21**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**83**

On-Road Vehicles

Table X-X. 2011 Off-site Emission Factors for Cruise Terminal Operation

Source	Movement Emission Factors (g/mi)									
	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2
Pvt. Auto	0.15	2.17	0.21	0.00	0.01	0.00	0.01	0.00	0.01	372.26
M. Coach/Shuttle Bus	0.16	1.53	8.21	0.01	0.19	0.19	0.17	0.00	0.00	1379.58
Taxi/Limo	0.15	2.17	0.21	0.00	0.01	0.00	0.01	0.00	0.01	372.26

Note:
Emission factors are speed-weighed averages using the default speed fraction from the EMFAC model

Table X-X. 2011 On-site Emission Factors for Cruise Terminal Operation

Source	Idle Emission Factors (g/hr)									
	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2
Pvt. Auto	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M. Coach/Shuttle Bus	3.17	26.30	75.05	0.04	0.97	0.97	0.89	0.00	0.00	4098.00
Taxi/Limo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Source	**Movement Emission Factors (g/mi)**									
	ROG	**CO**	**NOx**	**SOx**	**PM10**	**DPM**	**PM2.5**	**PMtire**	**PMbrk**	**CO2**
Pvt. Auto	0.91	4.20	0.32	0.01	0.05	0.00	0.05	0.00	0.01	952.34
M. Coach/Shuttle Bus	0.58	6.96	12.05	0.01	0.66	0.66	0.61	0.00	0.01	1505.00
Taxi/Limo	0.91	4.20	0.32	0.01	0.05	0.00	0.05	0.00	0.01	952.34

Note:
On-site movement emission factors assume traveling at the speed at 5 mph.

Table X-X. 2015 Off-site Emission Factors for Cruise Terminal Operation

Source	Movement Emission Factors (g/mi)									
	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2
Pvt. Auto	0.10	1.47	0.15	0.00	0.01	0.00	0.01	0.00	0.01	369.22
M. Coach/Shuttle Bus	0.14	1.41	6.16	0.01	0.16	0.16	0.15	0.00	0.00	1379.58
Taxi/Limo	0.10	1.47	0.15	0.00	0.01	0.00	0.01	0.00	0.01	369.22

Note:
Emission factors are speed-weighed averages using the default speed fraction from the EMFAC model

Table X-X. 2015 On-site Emission Factors for Cruise Terminal Operation

Source	Idle Emission Factors (g/hr)									
	ROG	CO	NOx	SOx	PM10	DPM	PM2.5	PMtire	PMbrk	CO2
Pvt. Auto	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M. Coach/Shuttle Bus	3.17	26.30	75.05	0.04	0.91	0.91	0.84	0.00	0.00	4098.00
Taxi/Limo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Source	**Movement Emission Factors (g/mi)**									
	ROG	**CO**	**NOx**	**SOx**	**PM10**	**DPM**	**PM2.5**	**PMtire**	**PMbrk**	**CO2**
Pvt. Auto	0.64	2.82	0.23	0.01	0.05	0.00	0.05	0.00	0.01	944.55
M. Coach/Shuttle Bus	0.51	6.40	9.04	0.01	0.57	0.57	0.52	0.00	0.01	1505.00
Taxi/Limo	0.64	2.82	0.23	0.01	0.05	0.00	0.05	0.00	0.01	944.55

Note:
On-site movement emission factors assume traveling at the speed at 5 mph.

On-Road Vehicles

Table X-X. Cruise Operating Days

Year	No. Days
2011	75
2015	75

Table X-X. 2011 Baseline and 2015 Cruise Terminal Operation Activity Data by Mode

Mode	Cruise	Retail	Res/Café	Event	Total Person-Trips	% Person-Trips [2]	Occupancy	# Trips
Pvt. Auto	6,062	37	449	503	7,052	47%	2.70	2,612
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Total	**12,300**	**102**	**1,224**	**1,380**	**15,006**	**100%**		**3,672**

Notes

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North Bay	0.17	0.25	54.2	767	133	8	46
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On-Road Vehicles

Table X-X. 2011 Baseline Off-Site Cruise Terminal Operations Emissions Data (tons/yr)

[short tons]	ROG	CO	NOx	SOx	PM10	DPM	PM25	PMtire	PMbrk	CO2
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M. Coach/Shuttle Bus	0.01	0.08	0.21	0.00	0.00	0.00	0.00	0.00	0.00	14
Taxi/Limo	0.02	0.08	0.01	0.00	0.00	0.00	0.00	0.00	0.00	18
TOTALS	**0.08**	**0.39**	**0.23**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**83**

Table X-X. 2015 Off-Site Cruise Terminal Operations Emissions Data (tons/yr)

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Taxi/Limo	0.17	2.50	0.25	0.01	0.02	0.00	0.02	0.00	0.01	627
Total	**0.71**	**10.18**	**2.82**	**0.03**	**0.12**	**0.05**	**0.11**	**0.01**	**0.03**	**2,862**

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M. Coach/Shuttle Bus	0.01	0.08	0.20	0.00	0.00	0.00	0.00	0.00	0.00	14
Taxi/Limo	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18
TOTALS	**0.05**	**0.28**	**0.21**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**83**

APPENDIX BI

Biological Resources Supporting Information

As background for Section 5.14, Biological Resources, of this EIR, this appendix provides information on marine communities and wildlife habitats, invasive and non-native species, and San Francisco Bay-Delta commercial and recreational sport fisheries.

Marine Communities and Wildlife Habitats

Open Water (Pelagic) Habitat

Because of its close proximity to the Pacific Ocean, the open water (pelagic zone) environment of the Central Bay is very similar to the open water coastal environment. Pelagic habitat is the predominant marine habitat in Central San Francisco Bay and includes the area between the water's surface and the seafloor. The physical conditions of the open water environment are constantly changing with tidal flow and season. As a result, they vary in temperature, salinity, dissolved oxygen, and turbidity within the water column depending on water depth, location, and season. The water column can be further subdivided into shallow-water/shoal and deepwater/channel areas.[1] The AC34 race activities are proposed to occur in the deepwater/ channels of the Central Bay with proposed docking/mooring occurring adjacent to existing Port wharfs in shallow water areas. No activities are proposed to occur in regions of the Bay characterized as shoals or mud flats. The pelagic water column habitat is predominantly inhabited by planktonic organisms that either float or swim in the water, fish, marine birds, and marine mammals.

Plankton Communities

Because of its proximity to the Pacific Ocean, the open water environment of the Central Bay is most like the open water environment along the coast. Lacking any significant freshwater inflow, this part of the Bay is inhabited by phytoplankton and zooplankton communities that are predominantly marine in composition and seasonality. Plankton species throughout the Bay-Delta are typically tolerant of broad salinity and temperature ranges because of the normal annual fluctuations between marine and freshwater influences.[2] However, those phytoplankton

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1 National Oceanic and Atmospheric Administration (NOAA), *Report on the Subtidal Habitats and Associated Biological Taxa in San Francisco Bay*, prepared by NOAA National Marine Fisheries Service, Santa Rosa, CA, June 2007a. 86 pages. (Hereinafter "NOAA 2007a").

2 NOAA 2007a.

species that can be classified as strictly marine include *Thalassiosira, frauenfeldii, Ceratium furca, Pyramimonas parkeae, Ceratium spp., Alexandrium catenella, Prorocentrum micans, P. gracile, Dinophysis acuminate*, and *Heterosigma* a*kashiwo*, and characterize the phytoplankton community in the Central Bay.[3] Because of the high water flow rates typically present in the Central Bay, plankton blooms do not regularly occur as they do in both the North Bay and South Bay.[4] The red algae, *Polysiphonia denudata*, can also occasionally be observed floating in Central Bay waters.[5]

The zooplankton community of the Central Bay consists of small invertebrate organisms that spend their entire life cycle in the water column and predominantly feed on phytoplankton and small-suspended organic particles. These include microzooplankton (tintinnids, rotifers, and copepod nauplii), larger copepods, cladocerans, and the larvae of benthic and pelagic invertebrate animals and fish (meroplankton). Other components of the zooplankton community include larvaceans, such as *Oikopleura dioica*, barnacle nauplii, polychaete worm larvae, ghost shrimp larvae, and krill, including the species *Nematoscelis dificilis, Thysanoessa gregaria*, and *Nyctiphanes simplex*.[6]

Zooplankton species typically change seasonally with a few species being present throughout the year. Likewise, abundance and distribution of zooplankton species vary substantially within the estuary in response to seasonal cycles and environmental factors such as salinity gradients. In the high-salinity portions of the Central Bay, the copepods *Acartia clausi, A. californiensis, Oithona davisae*, harpacticoid copepods, tintinnids, and the larvae of gastropods, bivalves, barnacles, and polychaetes dominate the community structure.[7] The opossum shrimp (*Neomysis mercedis)* is an especially important zooplankton species because of its dominant role as a preferred food for young fishes, including several protected species or species of concern like American shad, Striped bass, and green sturgeon.[8] [9] Mean zooplankton biomass has ranged from 10 to 50 milligrams of carbon per cubic centimeter for the Bay with the mean values occurring in the Central Bay.[10] Unlike the North and South Bays, the Central Bay is the least affected by introduced exotic species.[11]

Central Bay meroplankton, including macrozooplankton and micronekton, is dominated by the ctenophore (*Pleruobranchia bachei*), the isopod (*Syndotea laticauda*), the shrimps (*Palaemon macrodactylus*, *Crangon franciscorum*, and *C. Nigricauda*), the mysid (*Neomysis kadiakensis*), and the

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3 NOAA 2007a.
4 NOAA 2007a.
5 NOAA 2007a.
6 California Department of Fish and Game (CDFG), *Delta Outflow Effects on the Abundance and Distribution of San Francisco Bay Fish and Invertebrates, 1980-1985*, entered by the CDFG for the State Water Resources Board 1987 Water Quality/Water Rights Proceedings on the San Francisco Bay/Sacramento-San Joaquin Delta, 1987.
7 Ambler, J. W., J. E. Cloern and A. Hutchinson, "Seasonal Cycles of Zooplankton from San Francisco Bay," Hydrobiologia 129:177-197, 1985.
8 Adams, P. B., C. B. Grimes, S. T. Lindley and M. L. Moser, *Status Review of North American Green Sturgeon, Acipenser medirostris*, prepared by National Marine Fisheries Service, June 2002.
9 Sigfried, C. A. "Seasonal Abundance and Distribution of Crangon franciscorum and Palaemon macrodactylus (Decapoda, Caridea) in the San Francisco Bay-Delta," Marine Biological Laboratory. Biological Bulletin: 159, No. 1, August 1980. pp. 177-192.
10 Ambler, J. W., J. E. Cloern and A. Hutchinson, "Seasonal Cycles of Zooplankton from San Francisco Bay," Hydrobiologia 129:177-197, 1985.
11 Ibid.

medusa (*Polyorchis* spp).[12] Those meroplankton taxa that are found year-round throughout the Central Bay include two of the shrimp species (*Crangon fransicorum* and *C. nigricauda*) and northern anchovy.[13]

Pelagic Fish Community

Thirty-three (33) species of fish have been documented inhabiting Central Bay pelagic waters in the years 2005 through 2009, as shown in **Table BI-1**. Of these 33 taxa, three species account for 99 percent of the total abundance of fish regularly sampled in both the deep water and shallow areas of the Central Bay. Northern anchovy (*Engraulis. mordax*) is the overwhelming dominant species, accounting for up to 94 percent of those fish inhabiting the water column. Pacific herring (*Clupea pallasii*) and jacksmelt (*Atherinopsis californiensis*) are the second and third most common fish taxa in Central Bay waters, together accounting for an additional 5 percent of the fish sampled on an annual basis. The remaining thirty species collectively account for less than 1 percent of the fish species present annually.

TABLE BI-1
PELAGIC (WATER COLUMN) FISH COMMUNITY COMPOSITION AND ESTIMATED SPECIES DENSITY FOR CENTRAL SAN FRANCISCO BAY FOR YEARS 2005 THROUGH 2009

Species	Common Name	Mean Number of Fish Per Hectare-Meter						
		2005	2006	2007	2008	2009	Mean	% Comp.
Engraulis mordax	Northern anchovy	377	1,333	1,007	396	477	718	94%
Clupea pallasii	Pacific herring	8	5	7	84	50	31	4%
Atherinopsis californiensis	Jacksmelt	1	2	11	4	6	5	1%

Additional species present include topsmelt, shiner perch, California grunion, walleye surfperch, Pacific pompano, Pacific sardine, white croaker, plainfin midshipman, bay goby, American shad, Chinook salmon, longfin smelt, bat ray, Pacific staghorn sculpin, California halibut, English sole, surf smelt, threadfin shad, white seaperch, Pacific electric ray, brown smoothhound, big skate, striped bass, starry flounder, speckled sanddab, bay pipefish, Pacific tomcod, unidentified rockfish, Pacific chub mackerel, and redtail surfperch.

NOTE: Information is based on monthly midwater trawling data from the Interagency Ecological Program at Stations 110, 211, 212, 213, and 214.

SOURCE: Interagency Ecological Program for the San Francisco Estuary (IEP), San Francisco Bay Study, Unpublished Raw Midwater Trawl Data, 2005-2009.

Important managed fish species or sensitive species of concern that are present in Central Bay pelagic waters include Northern anchovy (*E. mordax*), longfin smelt (*S. thaleichthys*), Chinook salmon (*Oncorhynchus tshawytscha*), Pacific sardine, (*Sardinops sagax*), and English sole (*Parophrys vetulus*).

[12] NOAA 2007a, citing Gewant, D. S. and S. M, Bollens, “Macrozooplankton and Micronekton of the Lower San Francisco Estuary: Seasonal, Interannual, and Regional Variation in Relation to Environmental Conditions,” Estuaries 28(3):473-485, 2005.
[13] NOAA 2007a.

Marine Mammals

Seven species of marine mammals are known to currently occupy Central Bay waters. The most common and predominant are the harbor seal (*Phoca vitulina*), California sea lion (*Zalophus californianus*), harbor porpoise (*Phocoena phocoena*), and Eastern Pacific stock of the gray whale (a.k.a. California gray whale) (*Eschrichtius robustus*). Additionally, the stellar sea lion (*Eumetopias jubatus),* humpback whale (*Megaptera novaengliae*), and the California sea otter (*Enhydra lutra*) are occasionally observed in the Bay.

In general, the presence of marine mammals in San Francisco Bay is related to distribution and presence of prey species and foraging habitat. Additionally, harbor seals and sea lions use various intertidal substrates that are exposed at low to medium tide levels for resting and breeding. [14]

Of these four common inhabitants of the San Francisco Bay-Delta, harbor seals are the only year-round residents of the Bay-Delta, with colonies at Castro Rocks in San Pablo Bay, Yerba Buena Island in the Central Bay, and Mowry Slough in the South Bay.[15] The year-round harbor seal "haul-out" on Yerba Buena Island's southwestern corner is part of the U.S. Coast Guard lands on the island and is not identified as a site for use by the project. This haul-out has not historically been identified as a pupping site for harbor seals, but recent observations suggest that occasional pupping does occur there.[16] The current Bay-Delta harbor seal population is estimated at between 500 and 700 individuals.[17] Harbor seals forage throughout the Bay-Delta, feeding on schooling fish such as smelt, anchovies, herring, rockfish, sculpin, perch, and midshipmen, along with squid and mysid shrimp, all of which are present in the waters to be used by the project.

California sea lions use the San Francisco Bay-Delta for refuge and foraging but do not breed or pup within the Bay. California sea lions occur within the Bay-Delta in their highest numbers while migrating to and from their primary breeding areas on the Farallon and California Channel Islands, and when Pacific herring and salmon inhabit Bay-Delta waters to spawn or migrate to upriver spawning areas. Sea lions are known to swim up into the Delta along with migrating salmon, but most concentrate feeding in the Central Bay and where herring spawn. Similar to harbor seals, sea lions haul out onshore, often using anthropogenic structures such as boat docks and navigational buoys, although individuals may also haul out also on islands within San Francisco Bay, such as Alcatraz and Angel Islands. The largest California sea lion haul-out in San Francisco Bay has been at the Port of San Francisco Pier 39, where up to 800 sea lions have been historically counted. This group of sea lions has decreased in size in recent years, coincident

[14] NOAA 2007a.
[15] NOAA 2007a.
[16] Green, D.E., E. Grigg, S. Allen, and H. Markowitz. *Monitoring the potential impact of the seismic retrofit construction activities at the Richmond-San Rafael Bridge on harbor seals (Phoca vitulinarichardsi) May 1, 1998-September 15, 2005*, 2006.
[17] NOAA 2007a, citing Grigg, E. K., S. G. Allen, D. E. Green, and H. Markowitz, *Harbor Seal, Phoca vitulina richardii, Population Trends in the San Francisco Bay Estuary, 1970-2002*. California Fish and Game 90(2): pp 51-70, 2004.

with a fluctuating decrease in the herring population in the Bay. Sea lions often float on the surface in large groups of 10 to 20 after feeding.

The harbor porpoise is a near-shore species, commonly observed near the Golden Gate Bridge and open water areas of the Central Bay. The San Francisco Bay-Russian River stock, identified as a unique genetic group, ranges from Point Arena to Monterey Bay. At present, no accurate estimates of the size of the San Francisco Bay-Russian River population exist.[18] Unlike some of their cousins, harbor porpoises typically avoid boats and humans. Harbor porpoise eat mostly small schooling fish and invertebrates and, along with seals and sea lions, will feed on herring and anchovies.

The Eastern Pacific gray whale, also commonly referred to as the California gray whale, migrates between its mating/calving grounds in Baja, Mexico to its primary feeding grounds in Alaska and Canada on an annual basis. Gray whales are commonly sighted offshore in San Francisco Bay during peak migration periods in spring (northward) and winter (southward), and annually a few individuals are observed within the Bay.[19] Occasionally, gray whales on their migration will forage in nearshore waters such as San Francisco Bay, Drakes Bay, Tomales Bay, and Monterey Bay. They prey mostly on invertebrates that live on or in soft sediments in the shallows of the Bay-Delta.

Marine Birds

The San Francisco Bay-Delta is an important wintering and stop-over site for the Pacific Flyway. More than 300,000 wintering waterfowl use the region and associated ponds.[20] Bird guilds that use the open waters of the San Francisco Bay-Delta include the diving birds, which feed in deeper water on benthic invertebrates; dabblers, which feed in the upper water column of shallow subtidal areas; piscivores, which feed on fish; and opportunistic predators.[21] The dominant marine birds regularly inhabiting or using the Central Bay include cormorants (*Phalacrocorax* spp.), pigeon guillemot (*Cepphus columba*), herring gull (*Larus argentatus*), mew gull (*L. canus*), and California brown pelican (*Pelecanus occidentalis californicus*). Among the diving benthivores guild, canvasback (*Aythya valisineria*), greater scaup (*A. marila*), lesser scaup (*A. affinis*), and surf scooter (*Melanitta perspicillata*) are the most common. Species of marine birds that forage for invertebrates in the shallower depth waters of the Central Bay include the eared grebe (*Podiceps nigricollis*), the ruddy duck (*Oxyura jamaicensis)*, and the common goldeneye (*Bucephala clangula*).[22]

Additional information on marine birds using the Central Bay can be found in Section 5.14.4 of this EIR.

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18 NOAA 2007a.
19 Green, D.E., E. Grigg, S. Allen, and H. Markowitz. *Monitoring the potential impact of the seismic retrofit construction activities at the Richmond-San Rafael Bridge on harbor seals (Phoca vitulinarichardsi) May 1, 1998-September 15, 2005*, 2006.
20 NOAA 2007a.
21 NOAA 2007a.
22 NOAA 2007a.

Intertidal and Subtidal Habitats

Intertidal Habitats

Intertidal habitats, or the regions of the Bay that lie between low and high tides, in the Central Bay include sandy beaches; natural and artificial rock (quarried rip rap); concrete bulkheads; concrete, composite, and wood pier pilings; and mud flats. These intertidal habitats provide highly diverse and varied locations for marine flora and fauna. Proximity to the Golden Gate and Pacific Ocean has resulted in an intertidal zone inhabited by many coastal as well as estuarine species. The natural bluff and exposed rocky shorelines of Yerba Buena, Alcatraz, and Angel Islands, the Marin Headlands, Tiburon Peninsula, and portions of San Francisco's north shoreline and area within the Golden Gate National Recreation Area, interspersed with sandy pocket beaches, provide a different assortment of ecological niches from the quarried riprap rock areas found along Treasure, Alcatraz, and Angel Islands, areas along the north shoreline of San Francisco, and Marin County.

Little scientific documentation is available that describes the intertidal communities within the San Francisco Bay-Delta. However, in support of the Treasure Island Redevelopment Project,[23] an intertidal community characterization study was performed along the artificial rocky rip-rap shoreline of Treasure Island and along the natural western shoreline of Yerba Buena Island.[24] This study reported the hard substrate intertidal regions of the project area support numerous marine and estuarine species of red and green algae, bryozoa, sponges, ectoprocts, barnacles, mussels, chitons, crabs, and anemones. As stated previously, because of their proximity to and influence by coastal ocean water flowing through the Golden Gate, Central Bay intertidal invertebrate and algae communities contain many coastal hard substrate taxa[25] interspersed with typical estuarine taxa, as illustrated by the presence of both the hybridized bay mussel (*Mytilus trossulus/galloprovencialis*) and the coastal mussel (*M. californianus).*[26] The intertidal biological communities in the Central Bay also include both native and non-native species.[27]

The angular and piled rip-rap rocks that have been placed to protect numerous shoreline locations in the Central Bay have been observed to provide additional habitat for a more diverse invertebrate community than observed in natural hard substrate intertidal locations because of

[23] Treasure Island/Yerba Buena Island Redevelopment Project Draft EIR, 2010 Case No. 2007.0903E Final Draft dated March 16, 2011.
[24] Applied Marine Sciences, Inc. (AMS), *Survey of Intertidal Habitat and Marine Biota at Treasure Island and Along the Western Shoreline of Yerba Buena Island*. April 2009, prepared in support of Treasure Island/Yerba Buena Island Redevelopment Project Draft EIR, 2010 Case No. 2007.0903E, Final Draft dated March 16, 2011 (Hereinafter "AMS 2009b")
[25] AMS 2009b.
[26] Applied Marine Sciences, Inc. (AMS), *Technical Memo: Reconnaissance Survey of the Intertidal Marine Community Inhabiting Pier Pilings at the Port of San Francisco. March 22, 2011*, prepared for ESA and the Port of San Francisco in Support of the AC34 CEQA Analysis. (Hereinafter "AMS 2011")
[27] AMS 2009b.

the increased and protected surface area created by the piled rocks. These protected pockets provide numerous havens in which assorted marine species are able to survive and flourish.[28]

The concrete, wood, and composite pier and wharf pilings in Central San Francisco Bay also provide both intertidal and subtidal habitat for marine biota. In March 2011, a reconnaissance survey of marine biota attached to Port pilings at locations to be used for the project observed multiple species of barnacles, chitons, limpets, mussels, bryozoans, and tunicates, along with the native oyster (*Ostrea lurida*) and the sea star *Pisaster ochraceous*. Observed algae included the green algae *Ulva spp*., the brown algae (*Egregia menziesii*), and the red algae (*Polyneura latissima*). Additional species of algae are expected to be present but were difficult to identify due to the season of the survey. Both the hybridized bay mussel (*Mytilus trossulus/ galloprovencialis*) and the coastal mussel (M*. californianus)* were observed.[29]

Pocket sand beaches in Central California are typically inhabited by polychaetes, oligochaetes, and nematodes with oligochaetes generally found in the higher intertidal. Additionally, seasonal pulses of harpacticoid copepods and archiannelid worms have been reported.[30]

Subtidal Habitat

Central San Francisco Bay contains both soft sediment and hard substrate subtidal habitat. Soft bottom substrate ranges between soft mud with high silt and clay content and areas of coarser sand. The latter tend to occur in locations subjected to high tidal or current flow. Soft mud locations are typically located in areas of reduced energy that enable deposition of sediments that have been suspended in the water column, such as in protected slips, under wharfs, and behind breakwalls and groins.

The Central Bay region has the largest accumulation of natural hard substrate in the Bay-Delta. The hard substrate benthos in San Francisco Bay consists of both natural and artificial surfaces. Natural substrates include boulders, rock face outcrops, and low relief rock. Artificial hard substrate includes submerged concrete breakwalls, bulkheads, vessel structures, pilings, riprap, and pipelines. Pilings, riprap, and pipelines can be found in every San Francisco Bay region and are a dominant feature along the Port's waterfront. The western portion of the Central Bay, between Alcatraz Island and the Golden Gate, contains four submerged rocks or pinnacles: Arch Rock, Harding Rock, Shag Rock, and Blossom Rock. Several of these rise to within 40 feet of the sea surface. Most of these rock features were flattened to minimize navigation hazards when transiting the Bay. As a result, each of these natural features is surrounded by rubble and boulder fields.

These hard substrate areas provide habitat for an assemblage of marine algae, invertebrates and fishes, similar to the hard substrate in the intertidal zone of the Central Bay. Submerged hard

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28 AMS 2009b.
29 AMS 2011.
30 Oakden, J., Sandy Beaches; Overview of Beach Meiofauna and Macrofauna, prepared for NOAA, http://montereybay.noaa.gov/sitechar/sandy2.html, accessed March 30, 2011.

bottom substrate is typically covered with a mixture of turf organisms that is dominated by hydroids, bryozoans, tunicates, encrusting sponges, encrusting diatoms, and anemones. In the intertidal and near subtidal zones, the barnacles *Balanus glandula*, *Amphibalanus amphitrite* and *A. improvisus* are commonly present along with the Bay mussel, *Mytilus trossulus/galloprovincialis*, the invasive Asian mussel *Musculista senhousia*, and the native or Olympia oyster *Ostrea lurida*. Barnacles can also be found subtidally on pier pilings, exposed rock outcropping and debris.[31] At least six species of sponges, seven species of bryozoans, and the hydrozoans *Ectopleura crocea* and *G. franciscana* are found inhabiting both natural and man-made hard substrate.[32] Commonly observed isopods and amphipods include the surface deposit feeders Gnorimosphaeroma, sp., and *Synidotea laevidorsalis*, the algae grazers *Ampithoe valida*, *Sphaeroma quoianum*, and *Eogammarus confervicolus*, the carnivore *Hopkinsia plana*, and *Incisocalliope derzhavini*, *Jassa marmorata* and *Stenothoe*.[33]

In addition, three species of caprellids (i.e., detritivores, carnivores, and deposit feeders) are commonly observed only in the Central Bay.[34] Pacific rock crab (*Cancer antennarius*) and the red rock crab (*C. productus*) inhabit rocky, intertidal and subtidal areas in the Pacific Ocean and likely use San Francisco Bay as an extension of their coastal habitats.[35] Adult (age 1+) Pacific rock crabs are most commonly found in the Central Bay in both the fall and spring months. Juveniles are most common in the Central Bay from January to May and in the South Bay from July to December.[36] Pacific rock crabs move seasonally from channels (January to April) to shoals (June to December).[37] The Pacific and red rock crabs are frequent targets of sport anglers from piers and jetties.

The predominant seafloor habitat in the project area is unconsolidated soft sediment composed of combination of mud/silt/clay (particles 0.001 to 0.062 millimeters [mm] in diameter), sand (particles 0.062 to 2.0 mm in diameter), and pebble/cobble (particles 2 to 256 mm in diameter), with varying amounts of intermixed shell fragments. Exposure to wave and current action, temperature, salinity, and light penetration determine the composition and distribution of organisms within these soft sediments.[38] Based on many geologic and marine biological studies conducted within the Bay-Delta, unconsolidated sediments are present throughout the Bay-Delta and are the predominant substrate type.

The unconsolidated gravel, sand and silt sediments of the Central Bay can be subdivided into deepwater channels, slough channels, harbor, and shallow subtidal topographies, each exhibiting different sediment and ecological compositions and associated biological communities.[39] The

31 NOAA 2007a.
32 NOAA 2007a.
33 NOAA 2007a.
34 NOAA 2007a.
35 Hieb, K., *Cancer* Crabs. *In*: James J. Orsi. 1999. Report on the 1980-1995 Fish, Shrimp, and Crab Sampling in the San Francisco Estuary, California. http://www.estuaryarchive.org/archive/orsi_1999. (Hereinafter "Hieb 1999a")
36 Hieb 1999a.
37 Hieb 1999a.
38 NOAA 2007a.
39 NOAA 2007a.

western portion of the Central Bay, including the proposed AC34 race area, is characterized as coarse sand and gravel with shifting sands, muddy-sand and sandy-mud in the lee of the islands, and sand and sandy mud in the shallows and Port areas.[40]

The muddy-sand benthic community of the Central Bay consists of a diverse polychaete community represented by several subsurface deposit feeding capitellid species, a tube dwelling filter feeding species (*Euchone limnicola*), a carnivorous species (*Exogone lourei*), and the maldanid polychaete *Sabaco elongatus*. There are also several surface deposit feeding *Ameana* spp. persisting throughout the year.[41]

The harbor and main channel areas of the Central Bay are characterized as a mix of the benthic communities from surrounding areas (deep and shallow-water and slough marine communities) and include the obligate amphipod filter-feeder *Ampelisca abdita* and the tube dwelling polychaete *Euchone limnicola*. As a result of increased water flow and sedimentation in the harbor areas of the Central Bay, the majority of the species reported inhabiting seafloor sediments in this region of the Bay-Delta are deposit and filter feeders, including the amphipods *Grandidierella japonica*, *Monocophium acherusicum*, and *Monocorophium alienense*, and the polychaetes *Streblospio benedicti* and *Psuedopolydora diopatra.* There is also a relatively high number of subsurface deposit feeding polychaetes and oligochaetes in these areas, including *Tubificidae* spp., *Mediomastus* spp., *Heteromastus filiformis*, and *Sabaco elongatus*. There is sufficient community complexity and abundance to support relatively high abundances of three carnivorous polychaete species: *Exogone lourei*, *Harmothoe imbricata*, and *Glycinde armigera*.

A recent assessment of benthic infauna inhabiting Central Bay sand mining leases[42] reported a low-diversity, low-abundance community composed of 107 taxa that appeared to be heavily influenced by sediment disturbance and instability.[43] This sediment instability appeared to be the result of high currents in the area that characterize the portion of the Central Bay near the Golden Gate. The study reported observing a regionwide community where the benthic infauna community was dominated by nematodes, polychaetes, oligochaetes and nemerteans, all which are worms, and amphipods. Other dominant taxa reported included several native and introduced bivalves (clams) and the holothurian (sea cucumber) *Leptosynapta* spp. Total animal density was estimated at about 2,000 individuals per square meter.

The most common large mobile invertebrate organisms in the Central Bay include blackspotted shrimp (*Crangon nigromaculata*), bay shrimp (*Crangon franciscorum*), Dungeness crab (*Metacarcinus magister*), and slender rock crab (*Cancer g*racilis). Although other species of shrimp are present in the Central Bay, their numbers are substantially lower when compared to the number of bay and

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40 NOAA 2007a.
41 NOAA 2007a.
42 ESA, San Francisco Bay and Delta Sand Mining Draft Environmental Impact Report (EIR), CSLC EIR NO. 742. State Clearinghouse No. 2007072036, prepared for the California State Lands Commission, July 2010.
43 Applied Marine Sciences, Inc., Benthic Survey of Commercial Aggregate Sand Mining Leases in San Francisco Bay and Western Delta, August 2008. San Francisco Bay and Delta Sand Mining Draft Environmental Impact Report (EIR), CSLC EIR NO. 742. State Clearinghouse No. 2007072036. Appendix F. Prepared by ESA for the California State Lands Commission. Dated July 2010. (Hereinafter "AMS 2009a")

blackspotted shrimps present.[44] All of these mobile invertebrates are present throughout the Central Bay and provide an important food source for carnivorous fishes, marine mammals, and birds in San Francisco Bay's food web. Dungeness crabs use most of the Bay as an area for juvenile growth and development prior to returning to the ocean as sexually mature adults.[45]

The abundance of blackspotted shrimp typically peaks from May through August, and again from December to February.[46] The shrimp are most likely using San Francisco Bay as an extension of their coastal habitat.[47]

Submerged Aquatic Vegetation (SAV)

Subtidal plants and SAV occur throughout the Central Bay on both soft and hard substrate. On the shallow unconsolidated subtidal habitat within the Central Bay, such as in Clipper Cove and along the intertidal mudflats in Richardson Bay, the green algae, *Ulva/Enteromorpha*, *Gracillaria verrucosa* (formerly *pacifica*), *Ruppia maritime, Potamogeton pectinatus* and *Zostera marina* (eelgrass) frequently occur.[48] *Zostera* is a shallow subtidal as well as intertidal flowering plant found inhabiting bays, estuaries, and the leeside of islands, such as Treasure, Angel, Yerba Buena, and Alcatraz Islands.[49] Bed locations and size are determined by water depth and turbidity. Eelgrass can only become established in those areas of the Bay-Delta where water depth and turbidity allow light to penetrate to the seafloor.[50] In addition to the eelgrass beds present along the major islands in the Central Bay, extensive eelgrass beds are also located throughout Richardson Bay, in Clipper Cove between Yerba Buena and Treasure Islands, along the southern shoreline of the Tiburon peninsula, such as in Kiel Cove, and along the East Bay shorelines of Richmond, San Leandro, Oakland, and Alameda.[51] The eelgrass beds located throughout Richardson Bay are the largest in the Central Bay and the second largest in the entire Bay-Delta.[52] The Richardson Bay bed covers approximately 675 acres.[53] Several studies have demonstrated that fauna in eelgrass beds is enhanced in numbers, species, and standing crop compared to unvegetated soft bottom habitat.[54] Eelgrass abundance and density is dynamic and fluctuates from year to year as a result of fluctuating physical conditions including, but not limited to, high freshwater and sediment discharge from the Delta and Bay watersheds, increased turbidity, extensive and violent storms,

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44 NOAA 2007a.
45 Tasto, R. N., "San Francisco Bay: Critical to the Dungeness Crab?" In: T. J. Conomos, editor, San Francisco Bay: The Urbanized Estuary. Pacific Div Am Ass Adv Sci, San Francisco, California: 479-490, 1979.
46 Hieb, K., *Caridean shrimp. In*: James J. Orsi. 1999. Report on the 1980-1995 Fish, Shrimp, and Crab Sampling in the San Francisco Estuary, California. http://www.estuaryarchive.org/archive/orsi_1999. (Hereinafter "Hieb 1909b")
47 Hieb 1999b
48 NOAA 2007a.
49 Merkel & Associates, San Francisco Bay Eelgrass Inventory; October-November 2009, prepared for the California Department of Transportation and NOAA National Marine Fisheries Service, November 2010. (Hereinafter "Merkel & Associates 2010")
50 Merkel & Associates 2010.
51 Merkel & Associates 2010.
52 Merkel & Associates 2010.
53 Merkel & Associates 2010.
54 NOAA 2007a.

and water temperatures. SAV beds and plants are also primary spawning habitat for many invertebrate and vertebrate species in San Francisco Bay, most notably Pacific herring.[55]

In addition to eelgrass beds discussed above, because of the strong ocean influence in the Central Bay, additional species of red and brown algae are found attached to submerged and intertidal hard substrate, including pier pilings. These include *Cladophora serice, Codium fragile, Fucus gardneri, Laminaria sinclairii, Egregia, Halkymenia schizymenioides menziesii, Sargassum muticum, Polyneura latissima, Cryptopleura violacea,* and *Gelidium coulteri.*[56] In addition, the species *Codium fragile* subspecies *tomentosoidess, Bryopsis hypnoides*, *Chondracanthus* (formerly *Gigartina*) *exaspertata, Ahnfeltiopsis* (formerly *Gymnogongrus*) *leptophyllus* can be found inhabiting either hard or soft substrate.[57] Oceanic species decline in numbers and presence the further east in the Bay where the salinities can typically be much higher than oceanic species can tolerate.[58] The only flowering plant found in the Bay is surfgrass (*Phyllospadix*) found only at the entrance to the Bay no farther than Fort Baker and Fort Point on either side of the Golden Gate Bridge.[59] All submerged aquatic vegetation in the Central Bay is considered critical essential fish spawning habitat for Pacific herring (see Section 5.14.4.4 of this EIR).[60]

Demersal Fish

Many different fish species spend all or part of their life cycle in association with the demersal zone. These species include flatfish, gobies, poachers, eelpouts, and sculpins, who all live in close association with the benthos during their sub-adult and adult life. Others fish species, such as salmon, steelhead, and longfin smelt, use the benthos for foraging.

In total, 53 demersal fish species have been collected from California Department of Fish and Game (CDFG) Interagency Ecological Program (IEP) monthly bottom trawl fish collections between 2005 and 2009.[61] Of these species, the following 12 dominate the community structure, constituting 98 percent of the species that commonly inhabit the seafloor and immediately adjacent waters in both the deep and shallow water regions of the Central Bay (see **Table BI-2**):[62] Bay goby (*Lepidogobius lepidus*), English sole (*Parophrys vetulus*), speckled sanddab (*C. stigmaeus*), plainfin midshipmen (*P. notatus*), Pacific staghorn sculpin (*Leptocottus armatus*), shiner perch (*C. aggregata*), cheekspot goby (*llypnus gilberti*), Longfin smelt (*S. thaleichthys*), white croaker (*G. lineatus*), bonyhead sculpin (*Artedius notospilotus*), Pacific sandab (*Citharichthys sordidus*), and bay pipefish (*Syngnathus leptorhynchus*) account for 98 percent of the species present over the past five years and dominate the community structure. The remaining 41 taxa account for less than 0.1 percent each.

55 NOAA 2007a.
56 NOAA 2007a.
57 NOAA 2007a.
58 NOAA 2007a.
59 NOAA 2007a.
60 The Magnuson-Stevens Act defines "essential fish habitat" as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.
61 Interagency Ecological Program for the San Francisco Bay Estuary (IEP), *San Francisco Bay Study. 2005-2009*, unpublished raw bottom trawl data, 2005-2009. (Hereinafter "IEP 2005-2009b")
62 IEP 2005-2009b.

TABLE BI-2
DEMERSAL (SEAFLOOR) FISH COMMUNITY COMPOSITION AND ESTIMATED SPECIES DENSITY FOR DEEPWATER AND SHALLOW WATER LOCATIONS IN CENTRAL SAN FRANCISCO BAY FOR YEARS 2005 THROUGH 2009

		Mean Number of Fish Per Hectare						
Species	**Common Name**	**2005**	**2006**	**2007**	**2008**	**2009**	**Mean**	**% Comp.**
Lepidogobius Lepidus	Bay goby	89	309	154	963	708	445	33%
Parophrys vetulus	English sole	87	14	259	519	431	262	19%
Citharichthys stigmaeus	Speckled sanddab	136	117	265	195	328	208	15%
Porichthys notatus	Plainfin midshipman	96	133	307	356	92	197	14%
Leptocottus armatus	Pacific staghorn sculpin	17	11	71	186	82	73	5%
Cymatogaster aggregata	Shiner perch	60	44	84	47	89	65	5%
Ilypnus gilberti	Cheekspot goby	10	31	35	18	9	21	2%
Spirinchus thaleichthys	Longfin smelt	19	33	9	22	5	18	1%
Genyonemus lineatus	White croaker	13	5	16	3	22	12	1%
Artedius notospilotus	Bonyhead sculpin	7	7	21	3	5	9	1%
Citharichthys sordidus	Pacific sanddab	16	17	9	0	0	8	1%
Syngnathus leptorhynchus	Bay pipefish	5	2	3	16	12	8	1%

Additional species present include: Pacific tomcod, California tonguefish, California halibut, showy snailfish, Pacific herring, brown smoothhound, Pacific sardine, pygmy poacher, saddleback gunnel, bat ray, yellowfin goby, lingcod, chameleon goby, sand sole, big skate, river lamprey, Pacific sand lance, spotted cusk-eel, starry flounder, curlfin sole, spiny dogfish, black perch, arrow goby, white seaperch, brown rockfish, walleye surfperch, leopard shark, rubberlip seaperch, diamond turbot, scalyhead sculpin, thornback, threadfin shad, American shad, cabezon, kelp greenling, barred surfperch, onespot fringehead, spotfin surfperch, striped bass, and yellowtail rockfish.

NOTE: Information is based on monthly bottom trawling data from the Interagency Ecological Program at Stations 110, 211, 212, 213, and 214.

SOURCE: Interagency Ecological Program for the San Francisco Bay Estuary (IEP), *San Francisco Bay Study. 2005-2009*, unpublished raw bottom trawl data, 2005-2009.

Managed, protected, or other fish species of concern or special significance observed inhabiting Central Bay seafloor areas include Pacific sardine (*S. sagax*), English sole (*P. vetulus*), Pacific sanddab (*C. sordidus*), lingcod (*Ophiodon elongates*), Brown rockfish (*S. auriculatus*), Kelp greenling *Hexagrammos decagrammus*), Leopard shark *Triakas semifaciata*), spiny dogfish shark (*Squalus acantias*), skates (*Raja* spp.), cabezon (*Scopaenichthys marmaoratus*), Pacific herring (*C. pallasii*), and longfin smelt (*Spirinchus thaleichthys*).

Anadromous species use the San Francisco Bay estuary on their way up rivers to spawn and as a rearing area for juveniles on their way down from their birthplace in the river to the open ocean.[63] Native anadromous species include Chinook salmon (O. *tshawytscha*), steelhead trout (*Oncorhynchus mykiss gairdneri*), and both green and white sturgeon (*Acipenser medirostris* and

63 NOAA 2007a.

A. transmontanus). Central San Francisco Bay is designated as essential fish habitat for Chinook and Coho salmon, Green sturgeon, steelhead, and assorted fish species included in the Coastal Pelagic, Pacific Groundfish, and Pacific Coast Salmon Fish Management Plans. Sections 5.14.4.4 and 5.14.5.1 of the EIR provide additional information concerning essential fish habitat for protected and managed fish species.

Invasive and Non-Native Species

New species of estuarine and marine animals are inadvertently or intentionally introduced into California waters regularly. Often referred to as introduced, non-indigenous, alien, non-native, or exotic species, most pose little or no threat to native ecosystems or biological communities. However, a few have the potential to severely disrupt local ecosystems, fisheries, and human infrastructure.[64]

California has the largest number of known introduced estuarine and marine animals. It has been reported that over 230 taxa have been introduced to the San Francisco Bay-Delta, which has been described as the most invaded estuary in North America.[65] It is currently estimated that a new aquatic species is introduced into San Francisco Bay-Delta every 14 weeks, whereas before 1960 the rate was once every 55 weeks.[66]

Table BI-3 lists known invasive marine and estuarine species that inhabit San Francisco Bay-Delta waters. Introduced species now dominate all benthic communities within the Bay-Delta and make up more than 95 percent of the biomass and total abundance of organisms.[67] Known invasive species appear to be dominated by polychaete worms, mollusks, and crustaceans, but this may be more reflective of the ease of identification and detection than their actual representativeness. Of the known invasive species in California waters, 54 species of mollusks, 47 species of polychaetes, and 36 species of amphipods have been reported.[68] Invaded habitats tend to have low natural diversity, relatively simple food webs, and a history of recent natural or anthropogenic disturbance.[69] Estuaries and sheltered coastal areas appear to be among the most invaded habitats as a result of being naturally disturbed, low-diversity systems with historic centers of anthropogenic disturbance from shipping, industrial development, and urbanization.[70]

Invasive organisms are introduced by a variety of methods, the most prevalent being shipping, of which the largest single source is in ballast water. Other methods of introduction include fouling organisms that have attached themselves to ship hulls, navigation buoys, anchors, and anchor chains such as the Asian kelp, *Undaria pinnatifida*; recovered flotsam; "live" rock and plants from

64 Ray, G., Invasive Marine and Estuarine Animals of California, ERDC/TC ANSRP-05-2, August 2005. (Hereinafter "Ray, G. 2005")
65 Ray, G. 2005.
66 Roman, J., Aquatic Invasive Species; The Encyclopedia of Earth, 2010. http://www.eoearth.org/article/Aquatic_invasive_species, accessed March 22, 2011. (Hereinafter "Roman, J. 2010")
67 Roman, J. 2010.
68 Ray, G. 2005.
69 Ray, G. 2005.
70 Ray, G. 2005.

TABLE BI-3
KNOWN INVASIVE MARINE AND ESTUARINE SPECIES INHABITING SAN FRANCISCO BAY-DELTA

Species	Taxonomic Group	Species	Taxonomic Group
Anci rocoma pelseneeri	Protozoan	*Cuthona perca?*	Nudibranch
Boveria teredinidi	Protozoan	*Balanus improvisus*	Barnacle
Cot rnia limnoriae	Protozoan	*Balanus amphitrite*	Barnacle
Lobocona prorates	Protozoan	*Acartiella sinensis*	Barnacle
Mirifolliculina limnoriae	Protozoan	*Mtyicola orientalis*	Barnacle
Sphenophyra dosiniae	Protozoan	*Oithona davisae*	Barnacle
Trochammina hadai	Protozoan	*Pseudodiaptomus forbesi*	Barnacle
Blackfordia virginica	Hydrozoan	*Pseudodiaptomus marinus*	Barnacle
Cladonema uchidae	Hydrozoan	*Tortanus sp. Copepod*	Barnacle
Clava multicornis	Hydrozoan	*Ampelisca abdita*	Amphipod
Corymorpha sp.	Hydrozoan	*Ampithoe valida*	Amphipod
Ectopleura(Tubularia)	Hydrozoan	*Caprella mutica*	Amphipod
Garveia franciscana	Hydrozoan	*Caprella acanthogaster*	Amphipod
Gonothyraea clarki	Hydrozoan	*Caprella humboldiensis*	Amphipod
Maeotias inexspectat	Hydrozoan	*Chelura terebrans*	Amphipod
Obelia dichotoma	Hydrozoan	*Corophium acherusicum*	Amphipod
Aurelia aurita	Scyphozoan	*Corophium aliense*	Amphipod
Cliona sp. Porifera	Porifera	*Corophium heteroceratum*	Amphipod
Halichondria bowerbanki	Porifera	*Corophium insidiosum*	Amphipod
Haliclona loosanoffi	Porifera	*Gamarus daideri*	Amphipod
Microciona prolifera	Porifera	*Grandidierella japonica*	Amphipod
Prosuberites sp.	Porifera	*Jassa marmorata*	Amphipod
Diadumene cincta	Anthozoan	*Leucothoe sp.*	Amphipod
Diadumene franciscana	Anthozoan	*Melita nitida*	Amphipod
Diadumene leucolena	Anthozoan	*Melita sp.*	Amphipod
Diadumene (Haliplanella) lineata	Anthozoan	*Parapleustes derzhavini*	Amphipod
Boccardiella ligerica	Polychaete	*Transorchestia enigmata*	Amphipod
Ficopomarus enigmaticus	Polychaete	*Nippoleucon hinumensis*	Cumacean
Heteroma us filiformis	Polychaete	*Dynoides dentisinus*	Isopod
Manayunkia speciosa	Polychaete	*Iais californica*	Isopod
Maranzellaria viridis	Polychaete	*Limnoria lignorum*	Isopod
Marphysa sanguinea	Polychaete	*Limnoria quadripunctata*	Isopod
Nereis (Neanthes) succinea	Polychaete	*Paranthura sp. Isopod*	Isopod
Polydora ligni	Polychaete	*Sphaeroma quoyanum*	Isopod
Polydora limnicola	Polychaete	*Synidotea laevidorsalis*	Isopod
Potamilla sp. Polychaete	Polychaete	*Sinelobus sp.*	Tanaid
Pseudopolydora kempi	Polychaete	*Acanthomysis bowmani*	Mysid
Pseudopolydora paucibranchiata	Polychaete	*Deltamysis holmquistae*	Mysid
Sabaco elongatus	Polychaete	*Nebalia sp. Nebalian*	Mysid
Scolelepis squamata	Polychaete	*Eusariella zostericola*	Ostracod
Serpula gracilis	Polychaete	*Carcinus maenas*	Crab
Serpula vermicularis	Polychaete	*Eriocheir sinensis*	Crab
Spiochaetopterus costarum	Polychaete	*Rithropanopeus harrisii*	Crab
Spiophanes bombyx	Polychaete	*Exopalaemon carincaudata*	Shrimp
reblospio benedicti	Polychaete	*Palaemon macrodactylus*	Shrimp
Peloscolex gabriellae	Oligochaete	*Anisolabis maritima*	Insect
Tubificoides apectinatus	Oligochaete	*Trigonotylus uhleri*	Insect
Tubificoides brownae	Oligochaete	*Alcyonidium gelatinosum*	Bryozoan
Tubificoides wasselli	Oligochaete	*Anguinella palmata*	Bryozoan
Arctica islandica	Bivalve	*Bowerbankia gracilis*	Bryozoan
Crasso rea gigas	Bivalve	*Bugula "neritina"*	Bryozoan

TABLE BI-3 (Continued)
KNOWN INVASIVE MARINE AND ESTUARINE SPECIES INHABITING SAN FRANCISCO BAY-DELTA

Species	Taxonomic Group	Species	Taxonomic Group
Gemma gemma	Bivalve	*Bugula stolonifera*	Bryozoan
Geukensia demissa	Bivalve	*Conopeum tenuissimum*	Bryozoan
Lyrodus pedicellatus	Bivalve	*Cryotosula pallasiana*	Bryozoan
Macoma petalum	Bivalve	*Schizoporella unicornis*	Bryozoan
Musculista senhousia	Bivalve	*Victorella pavida*	Bryozoan
Mya arenaria	Bivalve	*Watersipora "subtorquata"*	Bryozoan
Mytilus galloprovincialis	Bivalve	*Zoobotyrion verticillatum*	Bryozoan
Petricola pholadiformis	Bivalve	*Barentsia benedini*	Ectoproct
Potamocorbula amurensis	Bivalve	*Ascidia sp.*	Tunicate
Teredo navalis	Bivalve	*Botrylloides schosseri*	Tunicate
Theora fragilis	Bivalve	*Ciona intestinalis*	Tunicate
Venerupis philippanarum	Bivalve	*Ciona savignyi*	Tunicate
Boonea bisuturalis	Gastropod	*Mogula manhattensis*	Tunicate
Busycotypus canaliculatus	Gastropod	*Styella clavata*	Tunicate
Crepidula glauca	Gastropod	*Acanthogobius flavimanus*	Fish
Crepidula plana	Gastropod	*Alosa sapidissima*	Fish
Eubranchus misakiensis	Gastropod	*Dorosoma petenense*	Fish
Litorina saxatilis	Gastropod	*Morone saxatilis*	Fish
Melanoides tubercuatus	Gastropod	*Tridentiger trigonocephalus*	Fish
Nassarius obsoletus	Gastropod	*Ascophyllum nodosum*	Algae
Okenia plana	Gastropod	*Aglaothamnion tenuissimum*	Algae
Philine auriformis	Gastropod	*Codium fragile*	Algae
Urosalpinx cincerea	Gastropod	*Bryopsis sp.*	Algae
Sakuraeolis enosimensis	Gastropod	*Polysiphoniea denudata*	Algae
Tenellia aspersa	Gastropod	*Sargassum filicinum*	Algae
Ovatella myosotis	Gastropod	*Undaria pinnatifida*	Algae
Catriona rickettsi	Nudibranch		

SOURCE: Ray, G., Invasive Marine and Estuarine Animals of California, ERDC/TC ANSRP-05-2, August 2005; Miller, K.A., "California's Non-Native Seaweeds," Fremontia 32:1, pp. 10-15, January 2004.

the aquarium trade; the accidental release of animals from packing materials by restaurants serving live seafood; and the live bait industry.[71] Finally, many invasive species, such as striped bass, channel and white catfish, and giant pacific oysters (*Crassostrea gigas*), have been deliberately introduced into California waters. A few of the most damaging in the San Francisco Bay-Delta include the Chinese mitten crab (*Eriocheir sinesis*), the European green crab (*Carcinus maenas*), the Asian clam (*Corbula amurensis*), and the isopod *Sphaeroma quoyanun*. The Chinese mitten crab is found throughout the Bay-Delta and is displacing native intertidal crabs. The Asian clam Corbula has completely changed the subtidal benthic infaunal community in the western Delta and, because of its voracious feeding on bacterioplankton, phytoplankton, and copepod larvae, has significantly reduced the phytoplankton community in the North Bay and western Delta, resulting in reduced

[71] Ray, G. 2005.

zooplankton and fish abundances and distributions.[72,73,74] It is one of the attributing factors to population declines in the Delta and longfin smelt populations in the Bay-Delta.[75]

San Francisco Bay-Delta Commercial and Recreational Sport Fisheries

Many important commercial and recreational fish species are known to spend a portion of their life history within coastal estuaries such as the San Francisco Bay-Delta. Some (e.g., Dungeness crab, Pacific herring, Chinook salmon, steelhead, white and green sturgeon) reside predominantly as adults in the ocean waters beyond the Golden Gate but spend their juvenile life stage or a portion of their adult life stage within the estuary itself. Others (e.g., Bay shrimp) spend their entire life histories within the Bay-Delta proper. As a result, activities that can have a negative effect on juvenile or adult fish and macroinvertebrate populations that are targeted by either commercial or recreational fishermen can have a greater geographic impact than just within the San Francisco Bay region. For the purposes of this analysis, the environmental setting area encompasses primarily Central San Francisco Bay and those fish and invertebrate species that are harvested in the nearshore coastal areas of Central California and whose life history has a key relationship with the waters of the Central Bay.

The data used for assessing commercial fisheries consist of catch and landing statistics compiled from two sources: (1) self-reporting by commercial fishermen within the established fishing blocks in which their catch was harvested, and (2) the San Francisco Bay Project Evaluation System Dredging Project interactive mapping database.[76]

For recreational fishing catch data, information compiled by the Pacific States Marine Fisheries Commission (PSMFC) as reported through the Pacific Recreational Fishing Information Network (RecFIN) was reviewed for the years 2006 through 2010.[77] For this report, estimates of whole catch that were available for review by California Recreational Fisheries Survey (CRFS) interviewers (RecFIN Type A), as well as catch that was not available for review but was voluntarily reported by anglers (i.e., those caught and released [Type B2] and those caught but not released [Type B1]), were included in this review. These data are limited in that they rely upon a limited number of CRFS interviewers to generate Type A results and unknown representativeness of voluntary reports (Type B). As the only consistent, ongoing database recording recreational fishing activity, however, the data can be considered an indicator of

72 Ray, G. 2005.
73 Kimmerer, W. J., "Response of Anchovies Dampens Effects of the Invasive Bivalve Corbula amurensis on the San Francisco Estuary food web," Mar Ecol Prog. Ser. 324:207-218. 23, October 2006.
74 Thompson, J.K. and F. Parchaso, *The immigration of an Asian bivalve Potamocorbula in San Francisco Bay and the subsequent environmental change,* 2003.
75 American Fisheries Society (AFS), Fisheries, Vol. 32, No. 6, June 2007.
76 NOAA, San Francisco Bay Project Evaluation System Dredging Project interactive mapping database, http://mapping2.orr.noaa.gov/website/pies_piledriving/viewer.htm, accessed March 18, 2011. (Hereinafter "NOAA 2011")
77 Recreational Fisheries Information Network (RecFIN), Recreational Fisheries Landing Data, http://www.recfin.org/, accessed March 18, 2011. (Hereinafter "RecFIN 2011")

recreational fishing effort and catch. Additional information regarding recreational fishing in Central San Francisco Bay was obtained from the San Francisco Bay Project Evaluation System Dredging Project interactive mapping database mentioned previously.[78]

The following discussion relies largely upon fishery data collected by the Interagency Ecological Program (IEP). The IEP regularly analyzes trends in fisheries generated through conduct of five long-term monitoring surveys in the estuary by IEP participants: (1) the Summer Townet Surveys, (2) the Fall Midwater Trawl Survey (FMWT), (3) the San Francisco Bay Study (Bay Study), (4) the Delta Smelt 20-mm Survey (20-mm Survey), and (5) the U.S. Fish and Wildlife Service (USFWS) Beach Seine Survey.[79] Based upon collected data, the IEP reports annual abundance indices, or surrogates for population estimates that can be analyzed over time, for multiple species of interest to the IEP.

Commercial Fisheries

For inland marine landings specific to San Francisco Bay, only San Francisco landing data were used for this analysis. It should be noted that commercial fishing is a constantly changing endeavor. Although many species of fish or invertebrates (e.g., Chinook salmon, Dungeness crab, sablefish, herring) may be commercially caught on an annual basis, other species, such as rock cod and Pacific herring, may only be commercially caught for a few years in a given region as a result of short-term environmental conditions, market shifts, population declines in one species that prompt harvesting of a less desirable species, and other factors. It should also be noted that many commercial fisheries operate on a predictable annual cycle, and that fishing pressure for certain fisheries may be nonexistent during the timing associated with the proposed project. Each of these issues associated with specific fisheries present is discussed in more detail below.

At present, only three species of fish and macroinvertebrates are harvested commercially in the San Francisco Bay-Delta: Bay shrimp (*Crangon franciscorum*), Pacific herring (*Clupea pallasi*), and Northern anchovy (*Engraulis mordax*). Brine shrimp (*Artemia spp)* are raised in most of the South Bay salt ponds but do not use Central San Francisco Bay at any stage of their life history and are therefore not included in this analysis. In addition, the San Francisco Bay-Delta, especially the Central Bay region, provides a critical rearing habitat for Dungeness crab (*Cancer magister*). Bay-Delta grown Dungeness crab juveniles account for a large proportion of crabs harvested in Central California offshore waters.

For the San Francisco region, CDFG commercial ocean fishing landing data, reported in pounds, were compiled for the five-year period from 2005 to 2009 (see **Table BI-4**), and for the August–September period within those years (see **Table BI-5**), coinciding with the timing for the proposed AC34 2012 and 2013 project activities and races. The following sections provide brief descriptions of each fishery.

78 NOAA 2011.
79 Interagency Ecological Program for the San Francisco Estuary (IEP), IEP Newsletter, Volume 23, Number 2, Spring 2010. (Hereinafter "IEP 2010")

TABLE BI-4
COMMERCIAL LANDINGS AND VALUE OF KEY SPECIES LANDED IN SAN FRANCISCO BAY FOR THE YEARS 2005 TO 2009

Taxa	2005	2006	2007	2008	2009
Pacific herring	0 pounds	0 pounds	0 pounds	0 pounds	0 pounds
	$0	$0	$0	$0	$0
Pacific herring egg on kelp (HEOK)	0 pounds	520 pounds	18,726 pounds	32,038 pounds	6,654 pounds
	$0	$130	$225	$6,408	$41,588
Pacific herring roe	289,481 pounds	1,490,853 pounds	576,210 pounds	1,379,997 pounds	1,013,610 pounds
	$61,969	$416,239	$108,741	$587,852	$479,438
Dungeness crab	3,668,533 pounds	3,773,768 pounds	1,493,123 pounds	1,872,916 pounds	1,961,901 pounds
	$6,693,840	$7,553,057	$4,127,528	$6,073,363	$4,700,599
Bay shrimp	52,055 pounds	38,457 pounds	50,114 pounds	45,873 pounds	69,527 pounds
	$199,567	$159,745	$225,505	$194,220	$299,779
Northern anchovy	29 pounds	155,400 pounds	0 pounds	91 pounds	0 pounds
	$29	$4,662	$0	$32	$0

SOURCE: California Department of Fish and Game (CDFG). 2011. Commercial Ocean Fishing, Final data for Years 2005 through 2009. http://www.dfg.ca.gov/marine/fishing.asp#Commercial)

TABLE BI-5
COMMERCIAL LANDINGS OF KEY SPECIES LANDED IN SAN FRANCISCO BAY FOR THE YEARS 2005 TO 2009 (AUGUST AND SEPTEMBER LANDINGS ONLY)

	2005	2006	2007	2008	2009
Pacific herring	0 pounds	0 pounds	0 pounds	0 pounds	0 pounds
Pacific herring egg on kelp (HEOK)	0 pounds	0 pounds	0 pounds	0 pounds	0 pounds
Pacific herring roe	0 pounds	0 pounds	0 pounds	0 pounds	0 pounds
Dungeness crab	0 pounds	0 pounds	0 pounds	0 pounds	0 pounds
Bay shrimp	15,705 pounds	10,946 pounds	9,420 pounds	7,048 pounds	7,668 pounds
Northern anchovy	15 pounds	0 pounds	0 pounds	0 pounds	0 pounds

SOURCE: California Department of Fish and Game (CDFG). 2011. Commercial Ocean Fishing, Final data for Years 2005 through 2009. http://www.dfg.ca.gov/marine/fishing.asp#Commercial

Pacific Herring (Herring, Herring Roe, and Herring Roe on Kelp)

Pacific herring (*Clupea pallasi*) spawn on vegetation in intertidal and shallow subtidal areas in San Francisco Bay and school as juveniles within the Bay. After a period of several months to more than a year, juveniles migrate to offshore areas to continue maturing until reaching adulthood and returning to the Bay to spawn. Section 5.14.4.4 of the EIR provides additional detail on Pacific herring spawning areas in the Central Bay.

The Pacific herring population and the size of the fishery depend on oceanic and Bay conditions. As a result, population sizes can fluctuate widely from year to year. According to CDFG, these fluctuations appear to be linked to El Niño events.[80] Reported increases in eelgrass (*Zostera marina*) bed acreage in the Central Bay[81] could also assist in increased spawning and populations. In addition, Pacific herring landings have varied greatly over the past century with fluctuating market demand that has shifted among its uses for fishmeal, human consumption, bait, and pet food. In 1973, the market came into its most recent configuration in primarily supplying roe (fish eggs) for Japanese consumption. Since then, herring in San Francisco Bay has been harvested primarily for its roe, with only small amounts of whole herring marketed for other purposes.[82]

Pacific herring landed in San Francisco Bay are currently marketed in one of three forms: whole fish, sac-roe, and roe on kelp or herring eggs on kelp (HEOK). Landing data for the period of 2005 through 2009, summarized in Table BI-4, indicate that herring roe made up the vast majority of the market. Whole herring fish were not reported as landed within this reporting period, and were last reported landed in San Francisco Bay in January 2004, when 77,040 pounds were landed at a value of over $20,000.[83]

The herring sac-roe fishery in California is limited to the four largest herring spawning areas: San Francisco Bay, Tomales Bay, Humboldt Bay, and Crescent City Harbor. San Francisco Bay has the largest spawning population of herring and produces more than 90 percent of the state's annual herring catch.[84] This fishery is managed through a limited entry system that began with 17 permits in 1973-1974, peaked with over 450 permits in the 1990s, and declined to 185 permits issued for the 2010-2011 season.[85]

Beginning with the 1984-1985 season, a sac-roe permittee received a permit on an experimental basis, to harvest roe on kelp, or herring eggs on kelp (HEOK), using fronds of giant kelp (*Macrocystis spp*.) suspended from unenclosed floating rafts. The kelp is brought into the Bay from the coast. The end product is also marketed to the Japanese food industry. For the 2010-2011

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80 Barnhart, R.A., *Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Southwest) – Pacific herring*, U.S. Fish Wildl. Serv. Biol. Rep. 82(11.79), U.S. Army Corps of Engineers, TR EL-82-4. 14 pp., 1988.
81 Merkel & Associates 2010.
82 California Department of Fish and Game (CDFG), Commercial Ocean Fishing, Final data for Years 2005 through 2009, http://www.dfg.ca.gov/marine/fishing.asp#Commercial, 2011. (Hereinafter "CDFG 2011")
83 CDFG 2011.
84 CDFG 2011.
85 California Department of Fish and Game (CDFG), FAQ Sheet San Francisco Bay 2010-2011 Season, 2010. (Hereinafter "CDFG 2010")

season, four HEOK permits were issued,[86] which are available to permittees willing to trade in their sac-roe permits. It should be noted that none of the landings reported for Pacific herring (whole fish, sac roe, or HEOK) in San Francisco Bay was within the months of August and September (see Table BI-5),[87] when the AC34 races are proposed to occur, and almost all of the commercial harvesting of Pacific herring occurs adjacent to the Point Pinole-Richmond eelgrass beds.

This fishery is closely monitored and controlled so that, barring catastrophic events, it can be expected to continue fluctuating with annual oceanographic conditions and market demand. Based on the low numbers of herring returning from the 2003-2004, 2004-2005, and 2005-2006 year classes, emergency regulatory action by the California Fish and Game Commission was taken in 2009 to close the ocean waters fishery to protect the San Francisco Bay Pacific herring stock. CDFG also recommended a zero harvest or no fishery option to the commission for the 2009-2010 San Francisco Bay gill net and herring-eggs-on-kelp fisheries, and a closure of the 2010 ocean waters fishery.[88] The herring fishery was re-opened for the 2010-2011 season, with a total quota set at 1,920 tons, divided between the different markets.[89]

Bay Shrimp

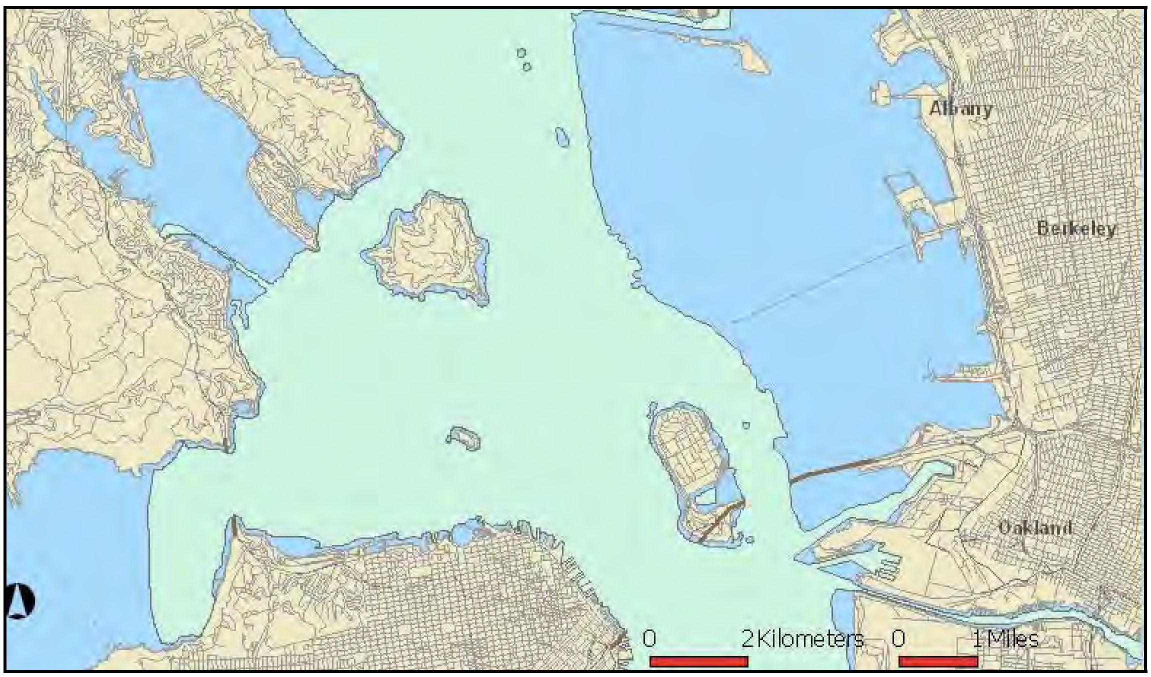
The Bay shrimp (*Crangon franciscorum*) is the dominant shrimp in most Pacific coast estuaries and the largest and most abundant large shrimp in San Francisco Bay. Bay shrimp are primarily found in the lower South Bay and from the North Bay to Suisun and Honker Bays. Juveniles migrate upstream to rear in shallow brackish water for several months. Maturing shrimp migrate downstream to cooler, higher salinity areas for reproduction. Abundance of Bay shrimp has been directly linked to freshwater outflow from the Delta.[90] The IEP abundance index for Bay shrimp reached a decade high in 2006, associated with high spring outflow that year.[91]

Beam trawls are used to harvest shrimp in San Francisco Bay waters east of the Golden Gate Bridge and in San Pablo Bay. The Bay shrimp fishery between 2005 and 2009 averaged 51,000 pounds per year, with a range of approximately 40,000 to 70,000 pounds per year (see Table BI-4). The commercial value of these landings has ranged between approximately $150,000 and $300,000 (see Table BI-4). At present, this fishery is market-driven. Since the product is used almost exclusively for angler bait, the market demand is not expected to change significantly in the foreseeable future. Bay shrimp is the only commercial species regularly harvested in recent years during the months of August and September, when the AC34 2012 and 2013 races are proposed to occur (see Table BI-5).

86 CDFG 2010.
87 CDFG 2011.
88 California Department of Fish and Game, California Fish and Game Commission Statement of Proposed Emergency Regulatory Action. Emergency Action to Amend Subsection (h)(6) of Section 163, Title 14, California Code of Regulations, Re: Pacific Herring Open Ocean Commercial Fishing Regulations. www.fgc.ca.gov/regulations/new/2009/163es.pdf, 2009b.
89 CDFG 2010.
90 Interagency Ecological Program for the San Francisco Estuary (IEP), 2008. IEP Newsletter. Volume 21, Number 2, Spring 2008. (Hereinafter "IEP 2008")
91 IEP 2008.

Dungeness Crab

Although Dungeness crabs (*Cancer magister*) are not commercially harvested within San Francisco Bay, they are a valuable commercial and recreational species for the Bay Area. The San Francisco Bay Estuary plays a key role in the growth and development of juvenile crabs.[92] Dungeness crabs reproduce in the ocean in winter; surviving juveniles then migrate nearer to shore the following spring. Most rearing of juvenile crabs within the region takes place in nearshore coastal waters, but estuaries such as Humboldt Bay and San Francisco Bay (see **Figure BI-1**) provide important nursery areas for the young.[93] These juveniles return to adjacent coastal waters after approximately eight to ten months.[94] Crabs nurtured within the estuary are larger than cohorts who remained in the ocean; they also represent a larger percentage of harvested crabs inhabiting coastal waters off the shore of San Francisco.[95]



SOURCE:[96]

Figure BI-1
Dungeness Crab Habitat Within Central San Francisco Bay

[92] California Department of Fish and Game (CDFG) Marine Region, *Annual Status of the Fisheries Report through 2003*, prepared for the California Fish and Game Commission, December 2004. (Hereinafter "CDFG 2004")
[93] CDFG 2004.
[94] IEP 2010.
[95] Pauley, G. B., D. A. Armstrong, R. Van Citter, and G. L. Thomas, *Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Southwest) Dungeness crab*. USFWS Biological Report 82(11.121), 1989. (Hereinafter "Pauley et al. 1989")
[96] NOAA 2011.

Dungeness crabs are landed as far south as Santa Barbara and northward to Crescent City. Eureka, San Francisco, and Bodega Bay report the largest landings in the state.[97] The Central California fishery encompasses a 400 square mile area, including the Gulf of the Farallones and waters north to the Russian River. During the 1950s, the Dungeness crab fleet consisted of 200 to 250 boats. Many boats left the fleet as the fishery began to decline in the 1960s. Currently, the fleet consists of about 190 vessels.[98] The commercial Dungeness fishery is managed based on crab sex, season, and size; only male crabs may be retained in the commercial fishery. The Central California season opens November 15 and continues through June 30. The fishery also imposes a minimum size restriction of 6.25 inches across the widest part of the carapace, the protective covering on the back of the crab.

Between 2005 and 2009, Dungeness crab was the highest value commercial landing for San Francisco (see Table BI-4). Landings here averaged 2.5 million pounds of crab over the five years with an average landing value of $5.8 million. As mentioned above, Dungeness crab populations undergo periodic cycles. In 2007, the reported landing for crab at San Francisco decreased from 3.8 million pounds in 2006 to 1.5 million pounds in 2007 (see Table BI-4). Dungeness crab populations and harvests will likely continue to fluctuate on a multiyear cycle, and increasing ocean water temperatures could result in a shift in the population northward, since adults and juveniles prefer colder waters.[99]

Northern Anchovy

The northern anchovy (*Engraulis mordax*) that inhabit San Francisco Bay for part of the year are part of the Central California subpopulation.[100] They typically winter in deeper waters off the California coast and return to shallower inland waters in the spring, including identified areas of the Central Bay (see **Figure BI-2**). Anchovies stay predominantly in deeper depths during daytime and migrate toward the surface at night.[101]

The northern anchovy is the most abundant fish in the Central Bay and an important prey species for many fishes and seabirds. Northern anchovy are harvested in San Francisco Bay for use as both live and frozen bait for sport fishermen. Primarily, northern anchovy are harvested in the Central Bay using a purse seine type net. Like the Bay shrimp fishery, harvests are market-driven by demand by sport fishermen. Northern anchovy landings in San Francisco Bay were virtually nonexistent between 2005 and 2009; the one exception to this was in 2006, when more than 150,000 pounds were landed (see Table BI-4).

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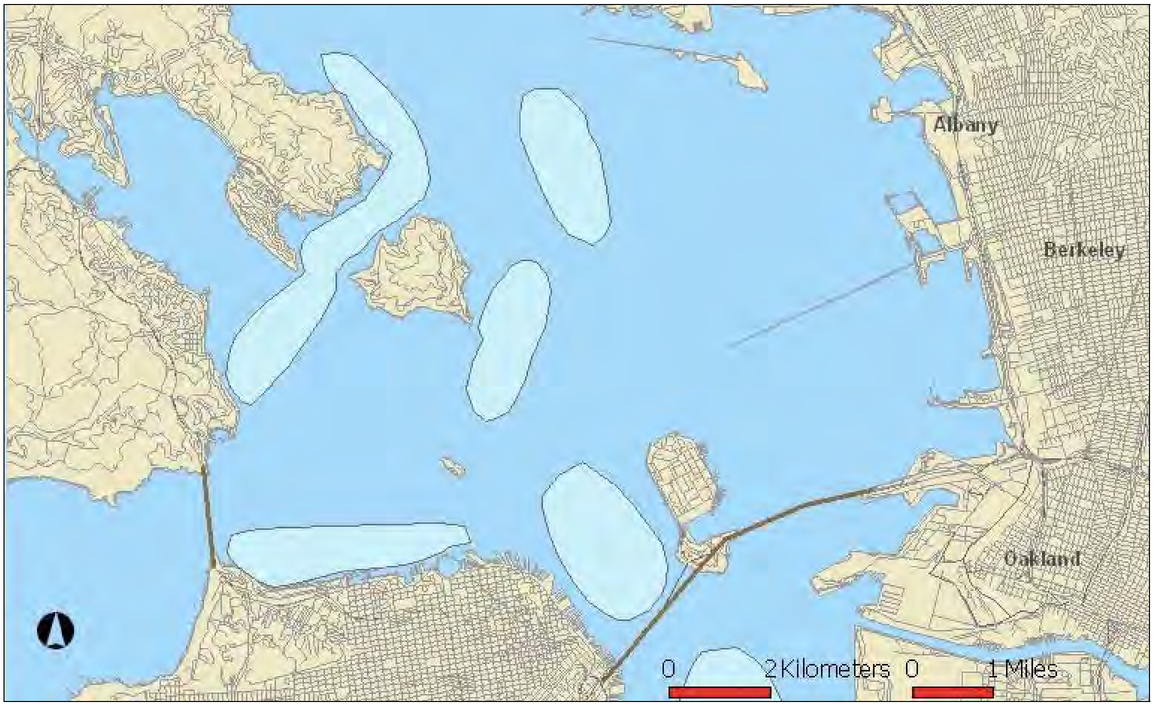
97 California Department of Fish and Game (CDFG), Final California Commercial Landings for 2008. http://www.dfg.ca.gov/marine/fishing.asp#Commercial, 2009.
98 CDFG 2004.
99 Pauley et al. 1989.
100 Kucas, S.T., Jr. and T. J. Hassler, *Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Southwest)--northern anchovy*, USFWS. Biol. Rep. 82(11.50), U.S. Army Corps of Engineers, TR EL-82-4.11 pp., 1986. (Hereinafter "Kucas 1986a")
101 Kucas 1986a.



SOURCE:[102]

Figure BI-2
Northern Anchovy Central Bay Summer Habitat

Aquaculture and Ocean Mariculture

Throughout the state, California commercial marine aquaculture facilities predominantly raise abalone, oysters, clams, scallops, seaweed, and mussels. Inland-based hatcheries and aquaculture farms raise trout, steelhead, salmon, tilapia, catfish, crayfish, striped bass, sturgeon, and other fish species for market sale and stock replenishment.[103] No mariculture operations currently exist within San Francisco Bay, but both Drakes and Tomales Bays, in Marin County to the north, support major oyster farms.

Recreational Sport Fisheries

Recreational sport fishing occurs in all regions of the estuary as well as in the coastal and open ocean areas beyond. Recreational fishing occurs from shore, pier, personal small craft, and charter boat. It should be noted that there is an interim advisory issued by the California Office of Environmental Health Hazard Assessment (OEHHA) in effect for sport fish caught in San Francisco Bay and Delta due to elevated concentrations of mercury, polychlorinated biphenyls (PCBs), and other pollutants of concern.[104] The advisory recommends limits on the

[102] NOAA 2011.
[103] National Oceanic and Atmospheric Administration (NOAA), California Aquaculture. http://aquaculture2007.noaa.gov/pdf/California_June262007.pdf, 2007b.
[104] California Office of Environmental Health Hazard Assessment (OEHHA), Interim sport fish advisory, available at http://www.oehha.ca.gov/fish/general/sfbaydelta.html, 2007, accessed March 18, 2011.

amount of fish that may be consumed by characteristics of both the fish caught and the potential consumer. This advisory, however, does not affect consumption of all popular sport fish in the area. For example, the advisory does not apply to salmon caught in the Bay-Delta or sport fish caught in the ocean. This advisory has been widely distributed, in multiple languages, and yet it is unknown how this outreach has affected fishing effort and consumption patterns.

Recreational fish catch as reported by RecFIN for the marine inland waters of the estuary during the period 2006 to 2010 are summarized in **Table BI-6**. These numbers are subject to the caveats discussed previously. It should also be noted that some species represented within RecFIN results for marine inland waters do not inhabit the Central Bay. However, these data do provide an indicator of the breakdown of fish caught by recreational fishermen over this period in the Bay.

TABLE BI-6
ESTIMATED SAN FRANCISCO BAY MARINE INLAND WATERS RECREATIONAL FISH LANDINGS FOR THE PERIOD 2006 TO 2010

All Months			August–September Only					
Species	Total, 2006–2010	% of All Species	2006	2007	2008	2009	2010	% of Total Catch
Jacksmelt	970,827	24.1%	33,789	13,503	8,400	48,874	16,588	12.5%
Northern Anchovy	562,303	14.0%	98,181	47,934	13,249	25,825	144,155	58.6%
Shiner Perch	242,026	6.0%	18,810	7,866	10,153	4,434	3,724	18.6%
California Halibut	210,159	5.2%	4,003	8,910	12,447	10,324	2,369	18.1%
Leopard Shark	189,174	4.7%	19,268	8,656	2,998	8,819	4,699	23.5%
Pacific Sardine	188,285	4.7%	464	0	553	102,968	3,837	57.3%
Striped Bass	174,508	4.3%	8,931	17,645	3,700	5,048	774	20.7%
American Shad	167,581	4.2%	4,151	0	0	425	0	2.7%
Bat Ray	147,949	3.7%	10,245	5,533	3,761	5,361	4,424	19.8%
Silverside Family	130,979	3.3%	23,088	1,076	1,750	368	0	20.1%
Dungeness Crab	76,170	1.9%	0	0	0	0	9,749	12.8%
Pacific Staghorn Sculpin	71,436	1.8%	4,146	1,327	7,024	2,310	5,823	28.9%
Unidentified (Sharks)	64,932	1.6%	4,194	3,349	4,926	2,477	329	23.5%
Red Rock Crab	63,538	1.6%	0	0	0	0	10,138	16.0%
Pacific Herring	59,950	1.5%	0	0	0	88	0	0.1%
Brown Smoothhound	58,752	1.5%	1,901	1,101	2,427	4,845	7,119	29.6%
Chub (Pacific) Mackerel	50,016	1.2%	5,481	47	0	15,721	0	42.5%
Surfperch Family	48,833	1.2%	3,490	2,496	458	2,181	255	18.2%
White Croaker	43,519	1.1%	3,195	3,059	1,229	459	251	18.8%

NOTE: Identified species make up at least 1 percent of the total fish reported. Estimates include number of fish examined by surveyors (A) plus number reported by anglers, both dead (B1) and live (B2). Numbers reported for individual years represent estimates for the months of August and September only, and the resultant percentage of total catch represents the proportion of the species landed during those months over the 5-year period.

SOURCE: Recreational Fisheries Information Network (RecFIN), Recreational Fisheries Landing Data, http://www.recfin.org/, accessed March 18, 2011.

Within Table BI-6, estimates are presented for fish caught during the overall 5-year period, as well as the 2-month period within each year coinciding with the proposed project (August–September). For several species (e.g., California halibut), the estimates for number of fish caught during this 2-month window approximate expected landings were catch uniformly distributed throughout the year (i.e., approximately 2 of 12 months, or 17 percent of the year). For other species, the landings during these periods are disproportionately high (e.g., northern anchovy, 59 percent) or disproportionately low (e.g., Pacific herring, less than 1 percent).

In addition to well-publicized declines in some of the sensitive species inhabiting the estuary, estimated populations of some of the more popular sport fish have declined in recent decades. Descriptions of trends within a few select sport fish are presented below.

Jacksmelt (*Atherinopsis californiensis*)

The jacksmelt seasonally migrates from nearshore coastal waters to bays and estuaries to spawn and rear. Most reproduction within the San Francisco Bay Estuary occurs from September to April. Juvenile jacksmelt rear in shallow areas of South, Central, and San Pablo Bays in late spring and summer, then migrate to deeper waters within the Bay, before migrating out of the San Francisco Bay Estuary in the fall.

In 2009, over 50 percent of the total jacksmelt captured through IEP trawling efforts occurred in the Central Bay. The 2009 CDFG age-0 jacksmelt abundance index was the second highest index on record and marks the third consecutive year of above average indices; this follows the general trend of increased abundance in years of low Delta outflow.[105] Sport landings reflect these higher abundances, as jacksmelt were the most frequently reported sport fish landed in San Francisco Bay inland marine waters (see Table BI-6).

Northern Anchovy (*Engraulis mordax*)

The northern anchovy is the most common fish in the lower San Francisco Bay Estuary and is an important prey species for many fishes and seabirds. Within Bay inland marine waters, the northern anchovy is second only to jacksmelt in the number of landings reported by recreational fishermen (see Table BI-6).

The 2009 IEP abundance index for northern anchovy was the fourth lowest on record, and only half of the study-period mean.[106] This marks the fourth consecutive year of declining indices, following the trend of colder ocean temperatures since 2006. For the estuary as a whole, CDFG collected northern anchovies in tows in each month of 2009, the latest year for which data have been analyzed to date. CDFG reported catch per unit effort (CPUE) was highest in the Central Bay and peaked during August.[107]

[105] IEP 2010
[106] IEP 2010
[107] IEP 2010

Shiner Perch (*Cymatogaster aggregata*)

Shiner perch live in marine and estuarine environments, including the San Francisco Bay Estuary. They have a wide salinity tolerance, although they typically inhabit areas above 10 part per thousand.[108] During winter or periods of high river flow, shiner perch migrate toward coastal areas and return to the estuary in summer to spawn.

Shiner perch were most commonly found in CDFG tows in the Central Bay. CDFG abundance indices for shiner perch were calculated at the lowest level since 1994, and approximately one-quarter of the historic mean.[109] Still, shiner perch were the third most frequently landed sport fish for the San Francisco marine inland region (see Table BI-6).

California Halibut (*Paralichthys californicus*)

The California halibut is a member of the subtropical faunal group that became common in the estuary in the 1980s and 1990s, concurrent with the most recent warm-water regime. Since that time, the California halibut has supported a valuable recreational fishery for the San Francisco Bay area, reporting the fourth most landings over the period from 2006 to 2010 (see Table BI-6). In the spring, adults migrate from deepwater wintering grounds to shallow coastal areas to spawn. Juveniles may remain within San Francisco Bay for up to two years before out-migrating to deeper waters.[110]

In 2009, the CDFG adult abundance index for California halibut declined for the third consecutive year to reach the lowest level since 2004.[111] Significant increases in the number of California halibut caught by sport fishermen in 2007 through 2009 were likely a direct result of the closure on sport fishing for salmon in the Bay and have placed considerable pressure on the fishery. This fishing pressure and associated harvest mortality have likely been key contributors to the 2009 adult California halibut abundance index decline.

Pacific Sardine (*Sardinops sagax*)

Pacific sardines are found in estuaries along the Pacific Coast but are more common in coastal and offshore areas. From 2006 to 2010, the Pacific sardine was reported as the sixth most frequently landed sport fish for San Francisco Bay recreational fishermen. Landings for the 5-year study period, as well as the proportion landed during the months of August and September, are skewed by the nearly 103,000 Pacific sardines reported caught in the period August to September 2009, representing over 50 percent of the approximately 190,000 Pacific sardines landed over the entire 5-year period (see Table BI-6).

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108 University of California Agricultural and Natural Resources California Fish Website, http://ucce·ucdavis.edu/datastore/datastoreview/showpage.cfm?usernumber=89&surveynumber=241, accessed March 30, 2011.
109 IEP 2010.
110 Kucas, S.T., and T.J. Hassler, *Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Southwest)--California halibut*, USFWS Biol. Rep. 82(11.44), U.S. Army Corps of Engineers, TR EL-82-4. 8 pp., 1986b.
111 IEP 2010.

APPENDIX HY

Hydrology and Water Quality Supporting Information

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Case No. 2010.0493E: AC34 / Cruise Terminal and Northeast Wharf Plaza (210317)

Figure HY-1
San Francisco Bay Area Clean Boating Map

COAST & HARBOR ENGINEERING

Coastal Engineering Impact Analysis
34th America's Cup, San Francisco Bay, CA

1. Introduction

The following Technical Memorandum describes the coastal engineering analysis performed by Coast & Harbor Engineering, Inc. (CHE) in support of EIR efforts by Environmental Science Associates (ESA) for the 34th America's Cup (AC34). CHE's work included conceptual design review, data processing and analysis, and numerical modeling of circulation in San Francisco Bay in order to evaluate the potential changes in circulation, sediment transport and salinity in San Francisco Bay while AC34 facilities are temporarily in place. Numerical modeling was limited to hydrodynamics, and conclusions regarding sediment transport, salinity and water quality were made using results of the hydrodynamic modeling.

2. Description of Proposed Temporary Facilities

Plans describing the proposed temporary facilities in each of the areas of interest were provided by AECOM. Additional information regarding dredging locations, volumes and depths were provided by ESA. Figure 1 shows the locations of the proposed temporary facilities along the San Francisco waterfront. Sections 2.1 to 2.8 describe the proposed temporary facilities in each area.

2.1. Marina Green

Figure 2 shows the Marina Green temporary facilities plan (all facilities plans provided by AECOM). The temporary in-water facilities proposed for inclusion at the Marina Green (2012 configuration) are:

- 500 linear ft of 16-ft wide floating concrete dock
- 60-ft, 40-ft, and 20-ft long moored boats at the floating concrete dock

2.2. Pier 27-29

Figure 3 shows the proposed Pier 27-29 temporary facilities plan. The proposed temporary facilities at the Pier 27-29 location (2013 configuration) include:

- 2,110 linear ft of 16-ft wide and 12-ft wide floating concrete docks along Pier 27-29
- 265-ft, 200-ft, 165-ft, 120-ft, and 100-ft long moored boats at the floating concrete docks

Figure 1. Locations of proposed temporary facilities

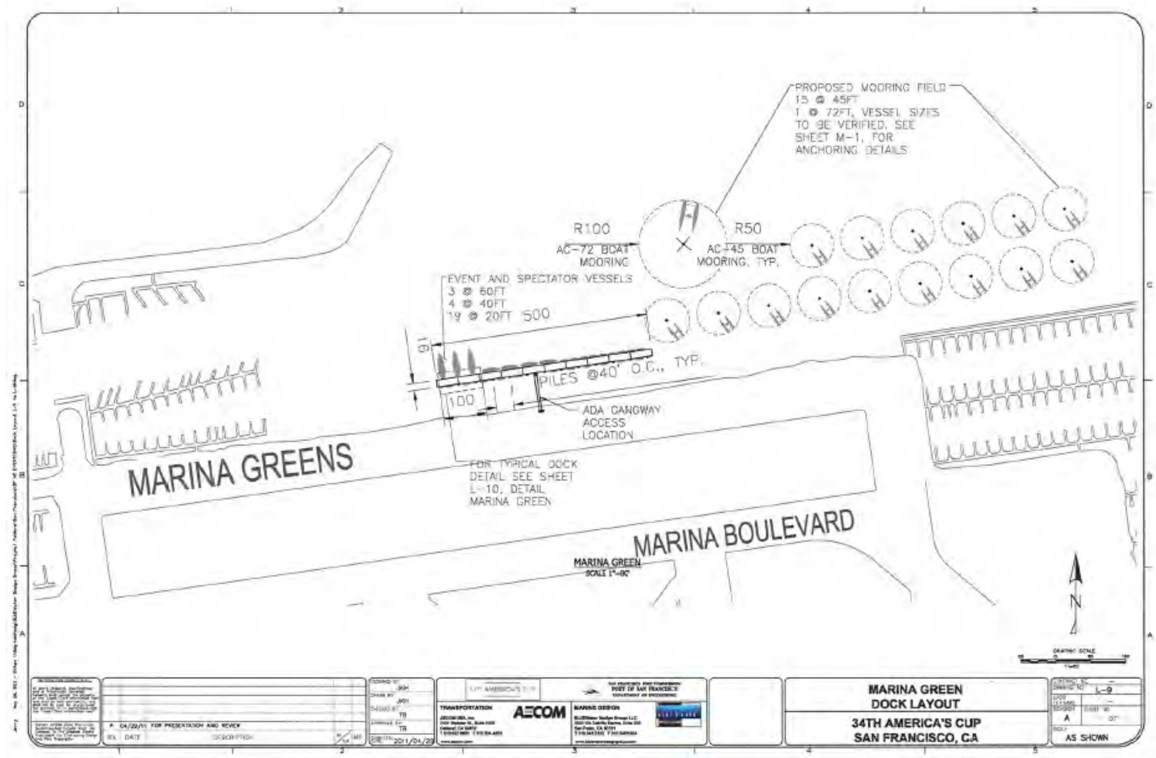

Figure 2. Proposed temporary facilities at Marina Green. Note: floating and fixed breakwaters to be installed prior to AC34 activities as part of West Yacht Harbor Renovation Project are not shown.

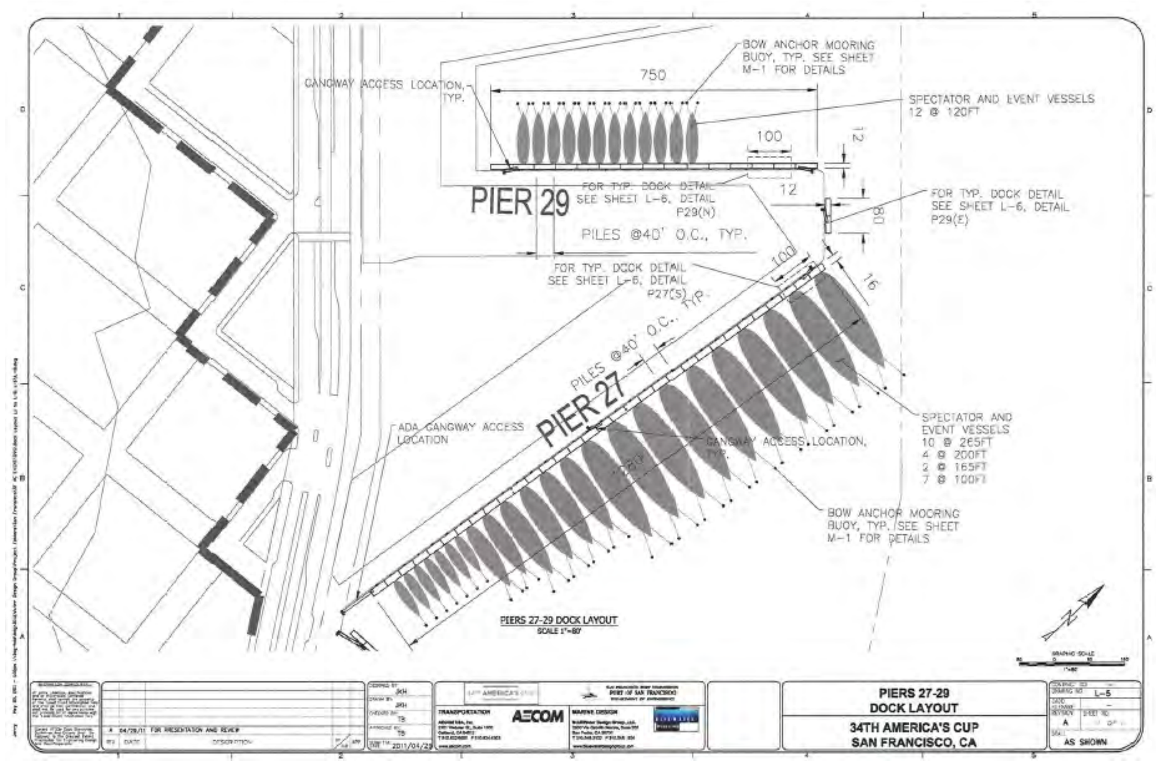

Figure 3. Proposed temporary facilities at Pier 27-29

2.3. Pier 19-23

Figure 4 shows the proposed Pier 19-23 temporary facilities plan. Proposed temporary facilities at the Pier 19-23 location (2013 configuration) include:

- 1,960 linear ft of 12-ft wide and 8-ft wide floating concrete docks
- 100-ft, 40-ft, and 20-ft long moored boats at the floating concrete docks

2.4. Pier 9

Figure 5 shows the proposed Pier 9 temporary facilities plan. Proposed temporary facilities at the Pier 9 location (2013 configuration) are:

- 550 linear ft of 12-ft wide floating concrete dock
- 150-ft, 100-ft and 80-ft long moored boats at the floating concrete docks

2.5. Pier 14-22.5

Figure 6 shows the proposed temporary facilities at Pier 14-22.5. Proposed temporary facilities in this location (2013 configuration) include:

- 1,480 linear ft of 12-ft wide floating concrete dock
- 265-ft, 200-ft, 165-ft and 100-ft long moored boats at the floating dock
- Dredging to a depth of 12 ft MLLW (41,000 cubic yards of dredging)

2.6. Pier 26-28

Figure 7 shows the proposed temporary facilities at Pier 26-28. Proposed temporary facilities at this location (2013 configuration) include:

- 2,080 linear ft of 8-ft wide floating concrete docks
- 100-ft and 40-ft long moored boats at the floating concrete docks
- Dredging the area south of Pier 28 to a depth of 12 ft MLLW (6,000 cubic yards of dredging)

2.7. Pier 30-32

Figure 8 shows the proposed temporary facilities plan at Pier 30-32. Proposed temporary facilities at this location include:

- 1,100 linear ft of 16-ft wide concrete docks along the north side of Pier 30
- 1,230 linear ft of 12-ft wide floating concrete docks along the south side of Pier 32
- 1,550 linear ft of 16-ft wide floating concrete wave attenuators at the seaward edge of Pier 30-32
- 60-ft, 40-ft and 30-ft long moored boats at the north edge of Pier 30
- Dredging the area between Pier 32 and Pier 36 to a depth of 17 ft MLLW (147,000 cubic yards of dredging)

2.8. Pier 80

Figure 9 shows the proposed temporary facilities draft plan at the Pier 80 location. Proposed temporary facilities at the Pier 80 location include only 1,000 linear ft of 12-ft wide floating concrete dock.

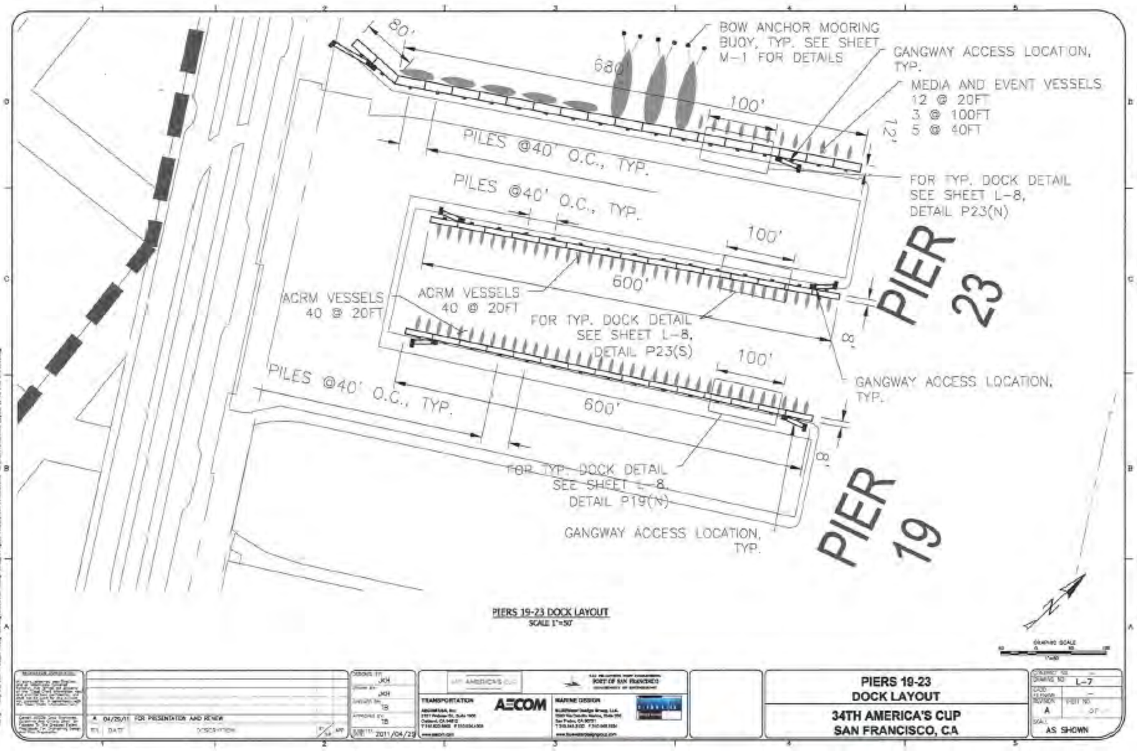

Figure 4. Proposed temporary facilities at Pier 19-23

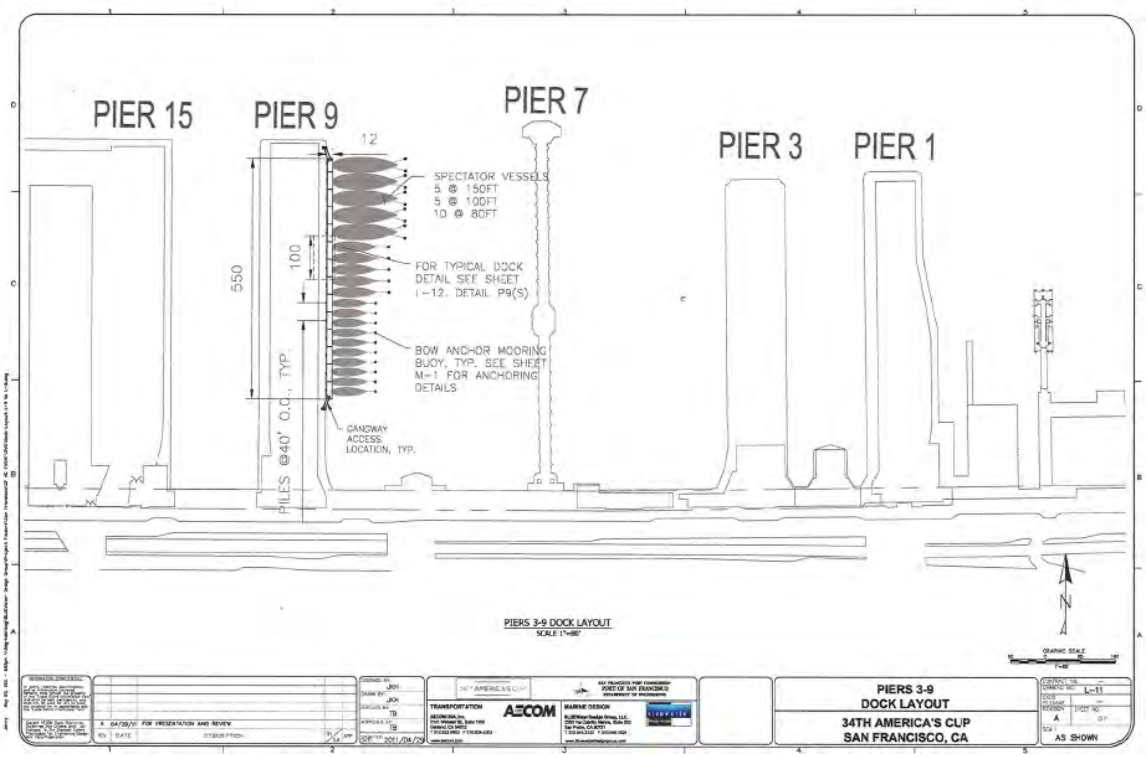

Figure 5. Proposed temporary facilities at Pier 9

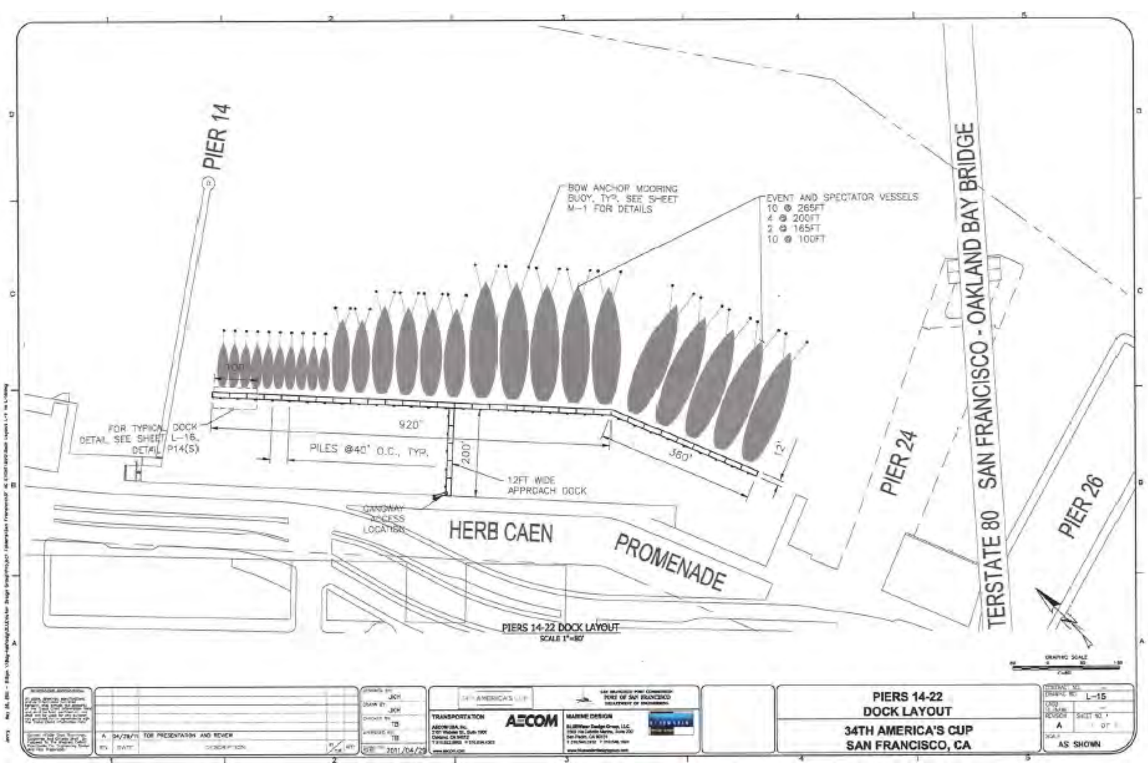

Figure 6. Proposed temporary facilities at Pier 14-22.5

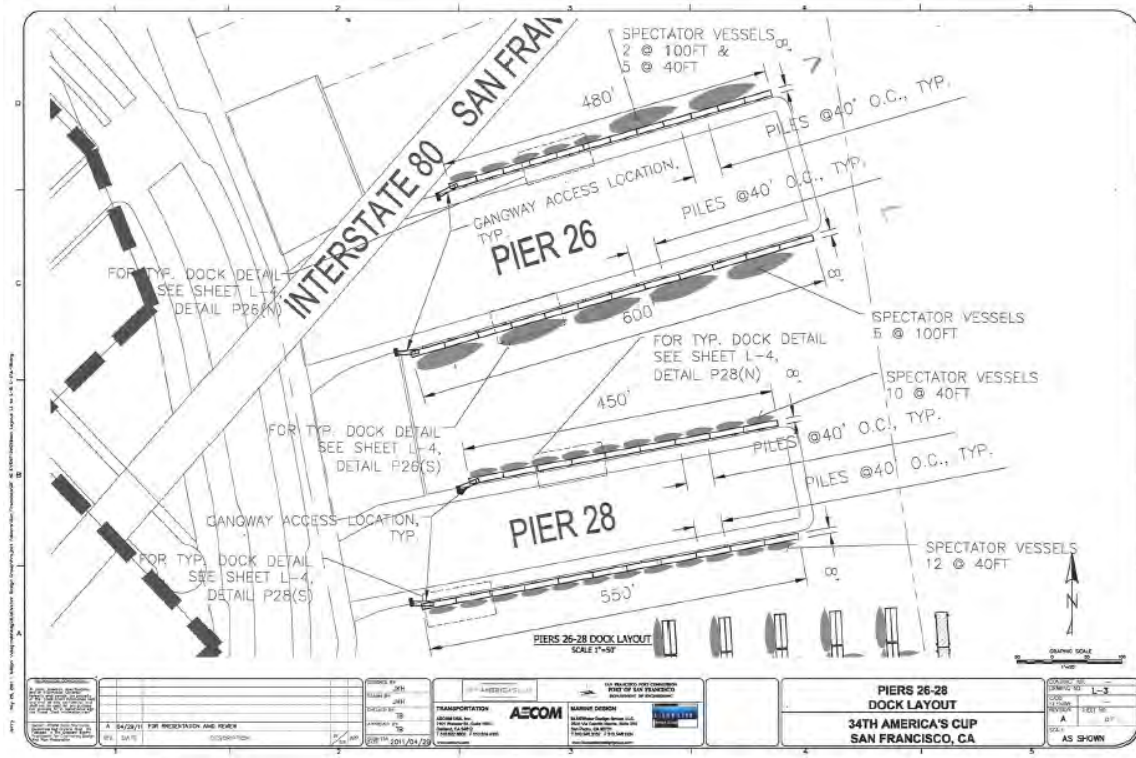

Figure 7. Proposed temporary facilities at Pier 26-28

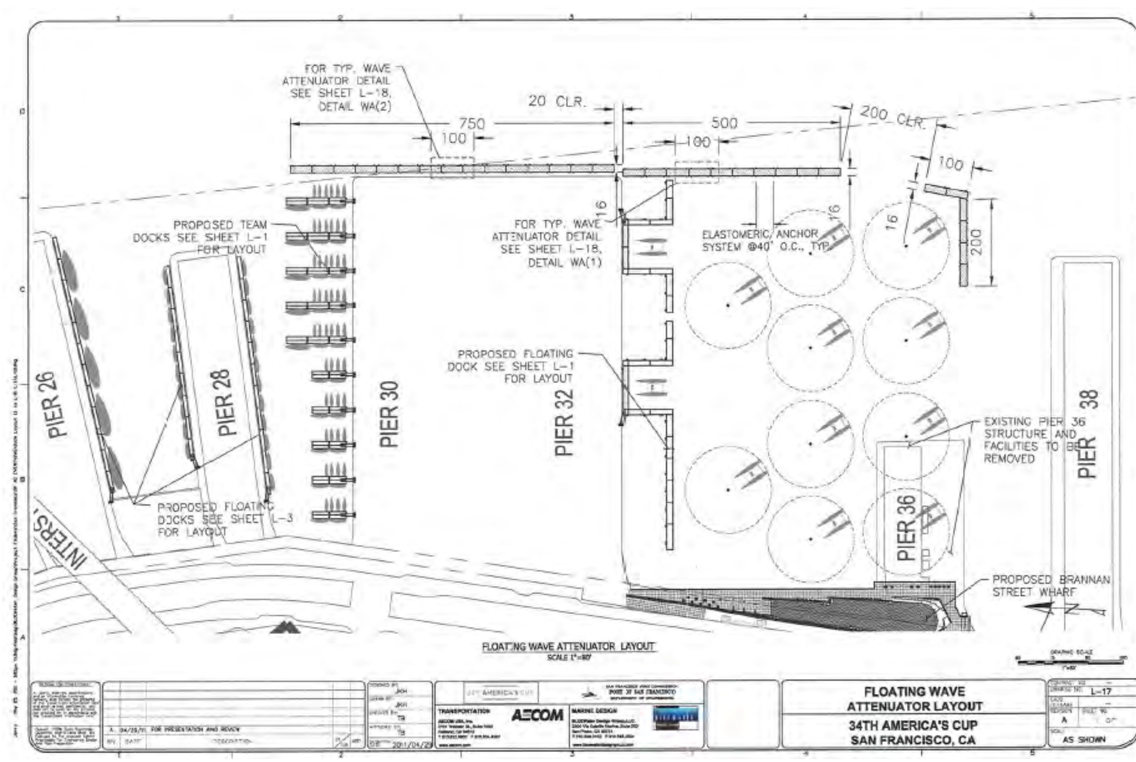

Figure 8. Proposed temporary facilities at Pier 30-32

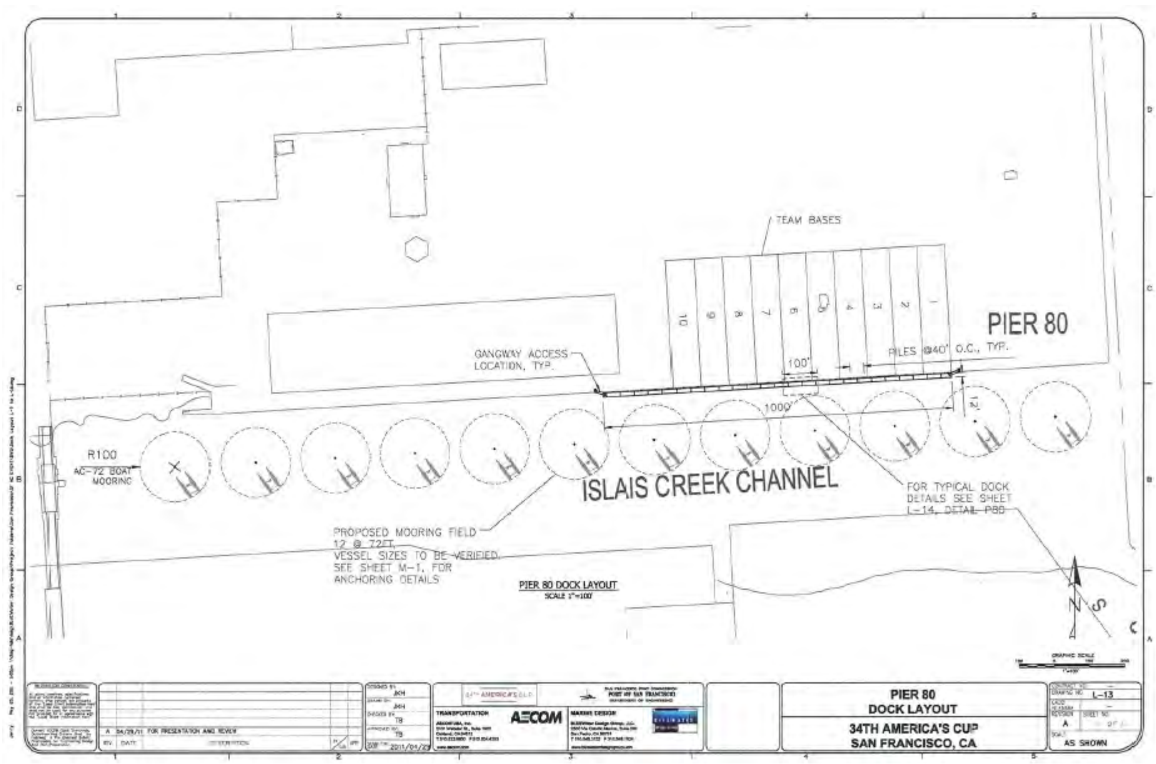

Figure 9. Proposed temporary facilities at Pier 80

3. Hydrodynamic Analysis of Potential Impacts

3.1. Methodology

The goal of the hydrodynamic analysis was to evaluate potential impacts of temporary installation of America's Cup facilities on hydrodynamics, sediment transport, salinity and water quality within San Francisco Bay. San Francisco Bay hydrodynamics are the primary driving force behind water quality, salinity and sediment transport. Therefore, conclusions regarding these other processes were made using results of the hydrodynamic modeling.

Hydrodynamic modeling was performed with the MORPHO-UNS two-dimensional (2-D) model (Kivva *et al.*, 2006). The hydrodynamic model was used to simulate tide-induced flows and water level fluctuations on a Bay-wide scale. River flows are negligible influence on velocities and water levels along the San Francisco waterfront and were neglected. Results of model validation at two locations in San Francisco Bay, including a simplified validation at Pier 27 as part of the Pier 27 Cruise Terminal Project, are provided in Appendix A.

Figure 10 shows the Bay-wide modeling domain, and Figure 11 shows color representations of the modeling domain bathymetry near areas of interest along the San Francisco waterfront. Hydrodynamic modeling simulations were conducted for a 15-day period starting on 10/5/2008, 08:00 AM (UTC), during which time a reasonable distribution of typical flows was observed.

The Bay-wide modeling domain was created using several bathymetry data sources, including San Francisco Bay Digital Elevation Model (DEM), hydrographic surveys from the Army Corps of Engineers, multibeam data from CA State University Monterey Bay and USGS, recent local bathymetry datasets provided by the Port of San Francisco, and miscellaneous other bathymetry datasets obtained on previous projects.

The modeling domains for both Existing Conditions and AC34 Conditions (with proposed America's Cup temporary facilities) were modified to include high resolution in the areas of interest and allow accurate incorporation of project features (floating docks, boats and wave attenuators). All floating project features were incorporated into the AC34 Conditions modeling domain as inverted bathymetry features with appropriate clearance.

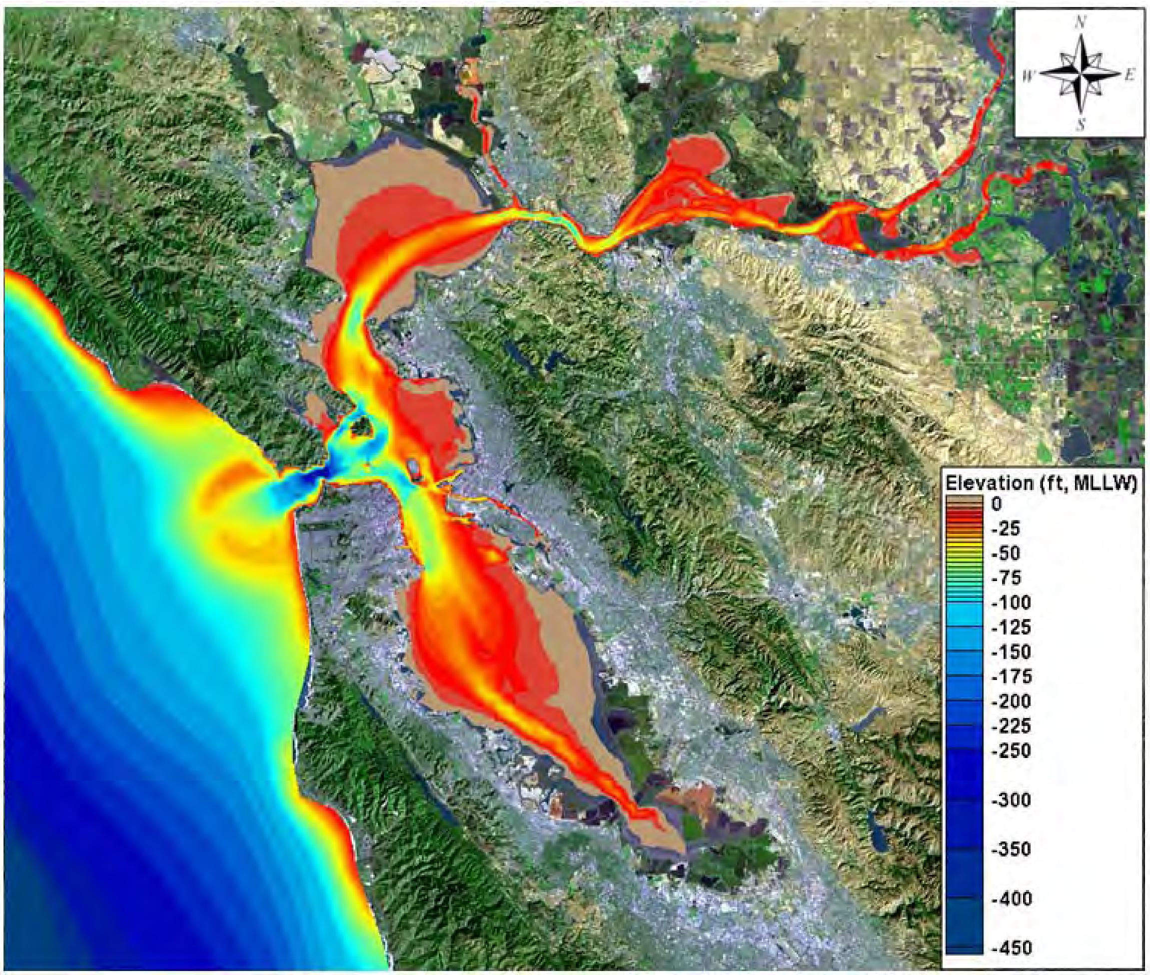

Figure 10. San Francisco Bay modeling domain (areas inside the Bay shown) and color contour representation of bottom elevations

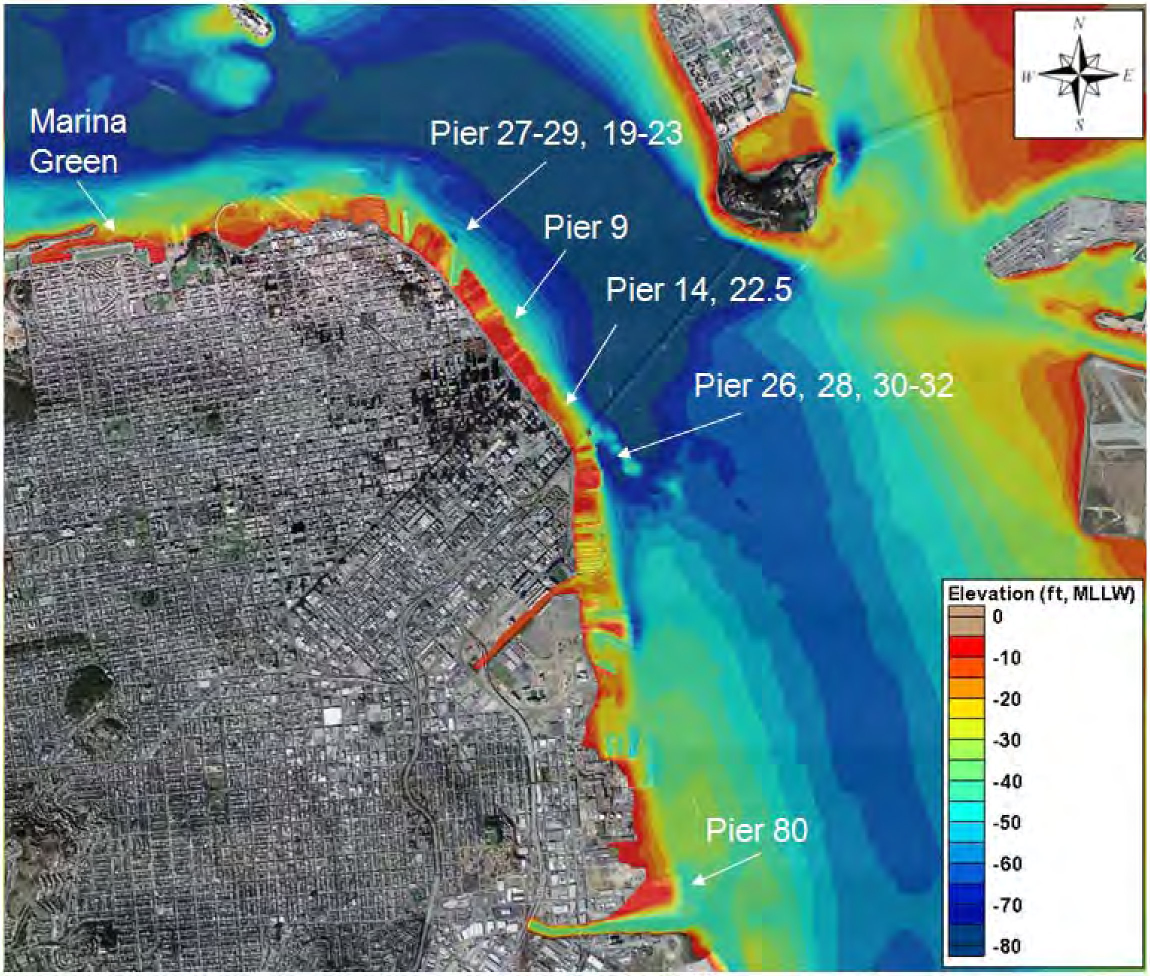

Figure 11. Modeling domain near San Francisco waterfront areas of interest and color contour representation of bottom elevations

Only floating concrete docks, wave attenuators and boats were incorporated into the hydrodynamic modeling. Smaller scale in-water features such as guide piles and moorings are expected to have a negligible effect on hydrodynamics and were not included in the modeling. Some temporary facilities are proposed for 2012 only and some for 2013 only. However, to simplify the modeling and add conservatism, all proposed facilities were included in the hydrodynamic modeling domain at the same time.

Moored boats were inserted with drafts according to boating industry data. Drafts were inserted according to vessel length, with the smallest boats (20 ft) having 1.2-ft draft and the largest boats (265 ft) having 16-ft draft. Drafts of the docks and wave attenuators were not provided at the time of this memorandum. Therefore floating concrete docks were assumed to have a constant 3-ft draft, and the Pier 30-32 wave attenuator system was assumed to have a constant 5-ft draft.

Both Existing and AC34 Conditions modeling domains also included the planned floating and fixed breakwaters located immediately adjacent to the Marina Green temporary facilities that are not associated with the AC34 project. These breakwaters were designed by CHE as part of the San Francisco Marina West Yacht Harbor Renovation Project and are scheduled for construction in 2012. In cases such as Pier 80 where elevations under the wharf and foundation details are unknown, it was assumed that the wharf was pile-supported with reasonable depths, which allows flows through the area and represents a conservative evaluation of potential impacts of the temporary facilities.

3.2. Modeling Results

Results of the numerical modeling effort are presented in Section 3.2.1 to 3.2.5 for each area of interest. Results include typical peak ebb and peak flood depth-averaged current velocities for Existing Conditions and AC34 Conditions, as well as differences in depth-averaged current velocity (AC34 Conditions minus Existing Conditions) surrounding the temporary facilities.

3.2.1. Marina Green

Figures 12 and 13 show typical peak ebb and flood depth-averaged velocities for Existing Conditions (left) and AC34 Conditions (right) at the Marina Green. Figure 14 shows depth-averaged current velocity differences (AC34 Conditions minus Existing Conditions) at the Marina Green location (peak ebb, left; peak flood, right). Analysis indicates that the velocity patterns surrounding the temporary facilities at the Marina Green are very similar for Existing Conditions and AC34 Conditions. Current speeds are slightly increased when flowing under the concrete floats and boats, and slightly deflected by those features in some areas, resulting in velocity reductions. Current velocity differences are smaller than 0.2 ft/sec at the temporary facilities and are smaller than 0.1 ft/sec at a distance of approximately 50-100 ft from the temporary facilities.

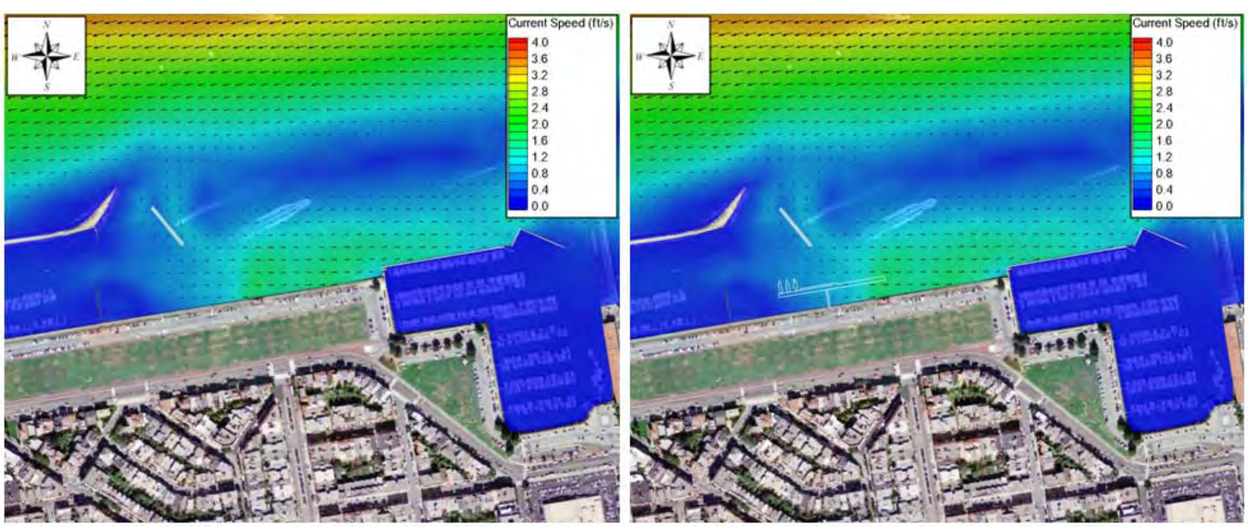

Figure 12. Typical ebb depth-averaged velocities for Existing Conditions (left) and AC34 Conditions (right) at Marina Green

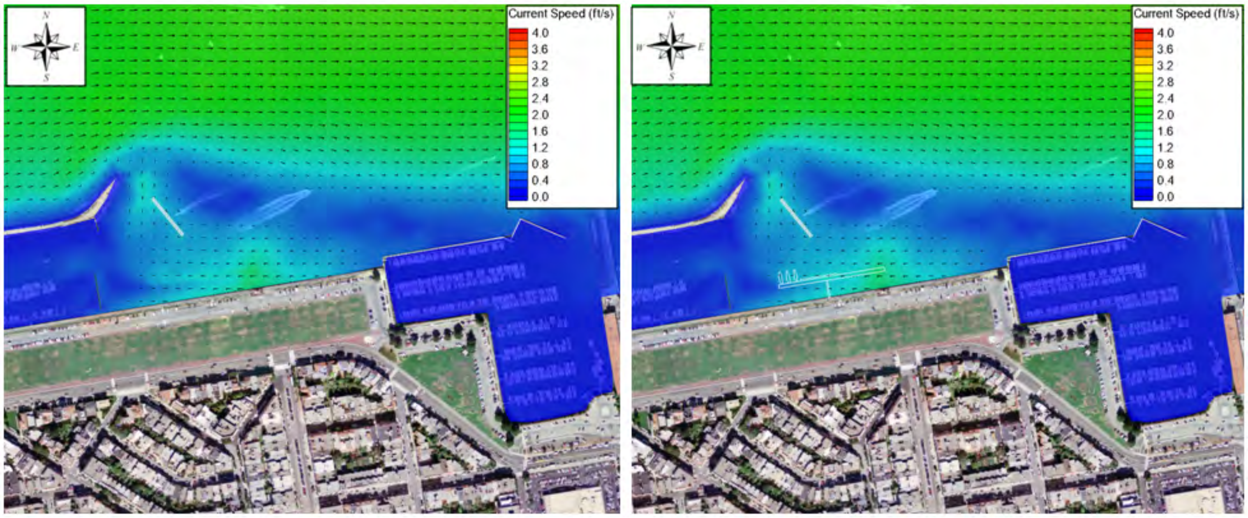

Figure 13. Typical flood depth-averaged velocities for Existing Conditions (left) and AC34 Conditions (right) at Marina Green

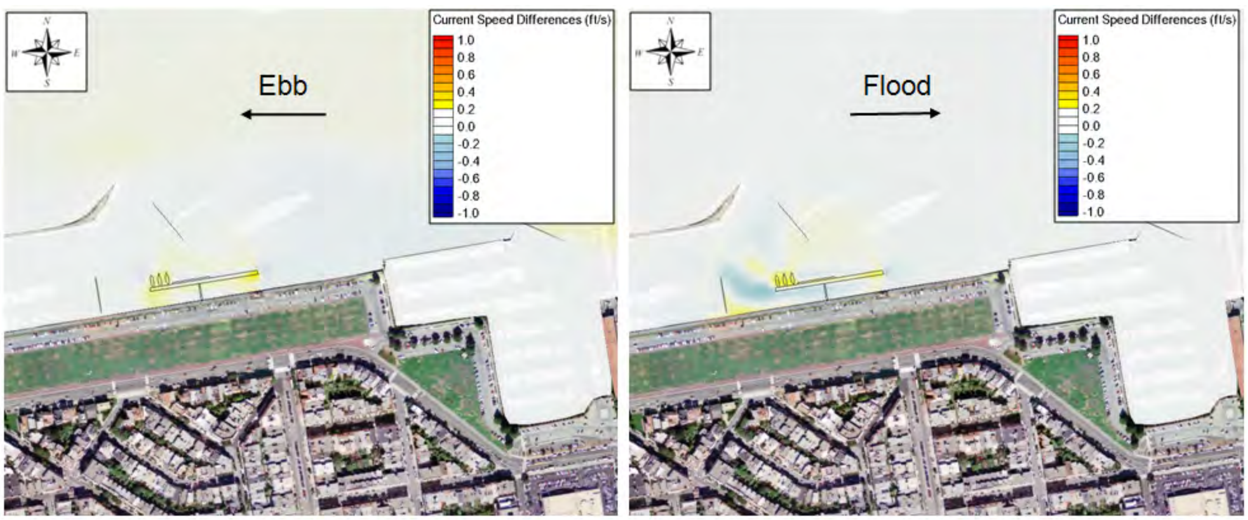

Figure 14. Typical ebb (left) and flood (right) depth-averaged velocity differences at Marina Green

3.2.2. Pier 27-29, Pier 19-23 and Pier 9

Figures 15 and 16 show typical peak ebb and flood depth-averaged velocities, respectively, for Existing Conditions (left) and AC34 Conditions (right) for the area including Pier 27-29, Pier 19-23 and Pier 9. Figure 17 shows depth-averaged current velocity differences (AC34 Conditions minus Existing Conditions) in the same area (peak ebb, left; peak flood, right).

Analysis indicates that the velocity patterns near the temporary facilities at Pier 27-29, Pier 19-23, and Pier 9 are modified within a local area surrounding the facilities. Along Pier 27, the largest current speed changes are present near the large boats (which have large drafts), as flows are pushed under the boats and in some areas deflected away from the boats. Current speed differences are smaller than 1.3 ft/sec at the location of the temporary facilities, and are smaller than 0.1 ft/sec at a distance of approximately 700-1,000 ft from the temporary facilities. These distances are on the same order in size as the facilities themselves.

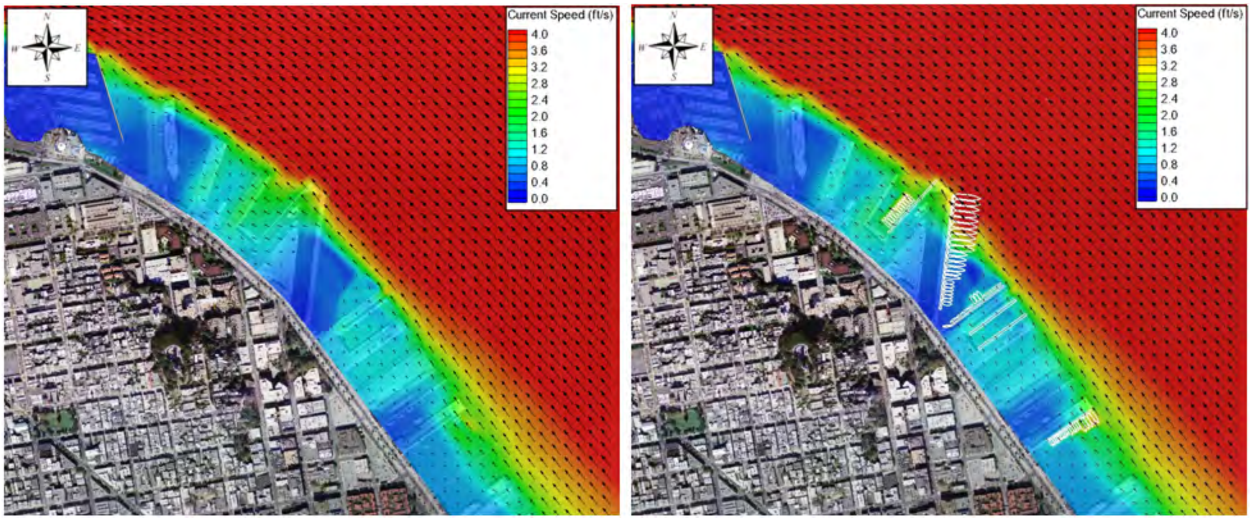

Figure 15. Typical ebb depth-averaged velocities for Existing Conditions (left) and AC34 Conditions (right) near Pier 27-29, Pier 19-23 and Pier 9

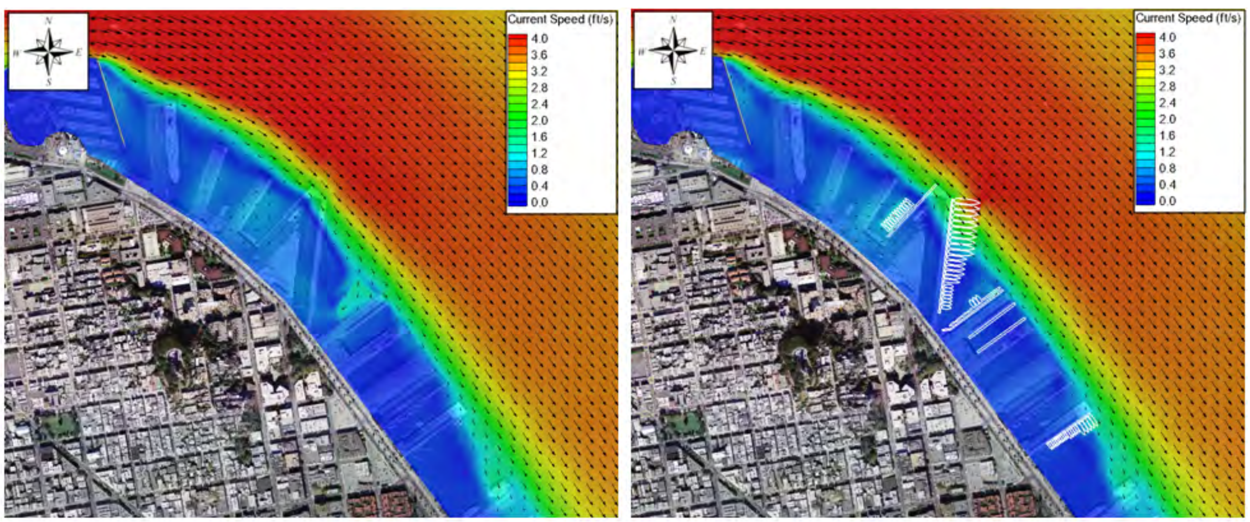

Figure 16. Typical flood depth-averaged velocities for Existing Conditions (left) and AC34 Conditions (right) near Pier 27-29, Pier 19-23 and Pier 9

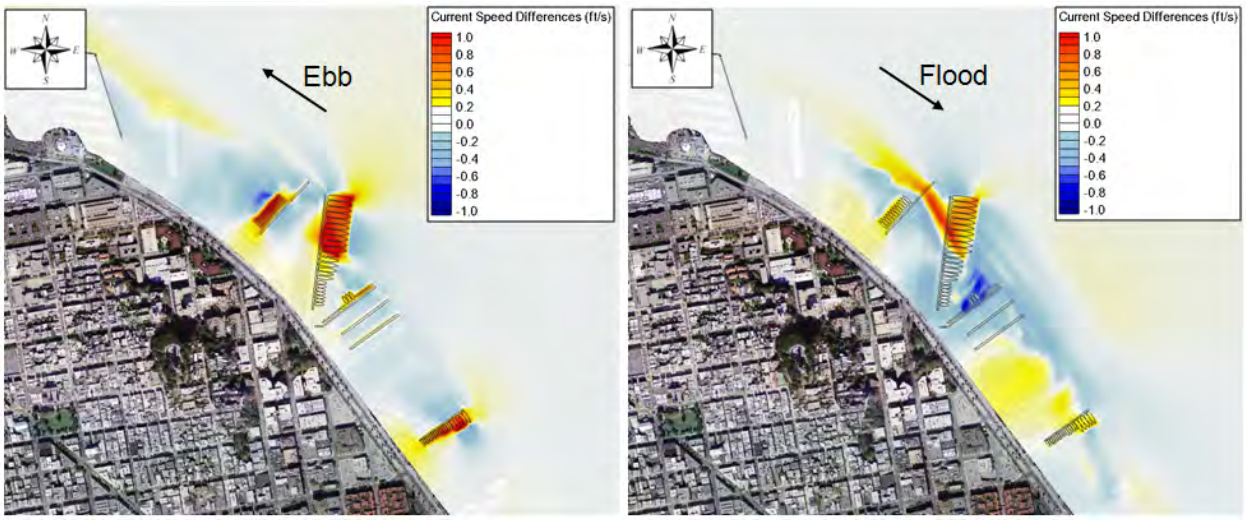

Figure 17. Typical ebb (left) and flood (right) depth-averaged velocity differences near Pier 27-29, Pier 19-23 and Pier 9

3.2.3. Pier 14-22.5

Figure 18 and 19 show typical peak ebb and flood depth-averaged velocities for Existing Conditions (left) and AC34 Conditions (right) near Pier 14-22.5. Figure 20 shows depth-averaged current velocity differences (AC34 Conditions minus Existing Conditions) in the same area (peak ebb, left; peak flood, right).

Analysis indicates that the velocity patterns surrounding the temporary facilities in this area are measurably affected only within the immediate vicinity of the new structures. The largest flow changes occur on peak flood tide, when currents are both deflected by the features (causing reductions in speed) and in some areas squeezed under the larger-draft boats (causing a predicted increase in speed).

Current velocity differences are 1.5 ft/sec and smaller at the location of the temporary facilities, and are less than 0.1 ft/sec at a distance of approximately 300-700 ft from the temporary facilities. These distances are on the same order in size or smaller than the facilities themselves.

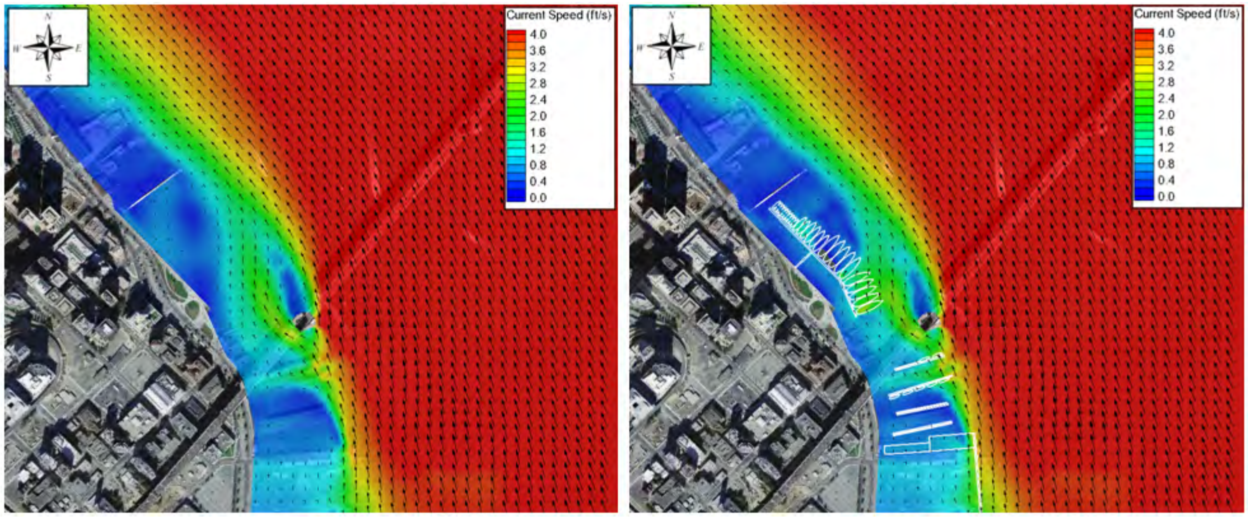

Figure 18. Typical ebb depth-averaged velocities for Existing Conditions (left) and AC34 Conditions (right) near Pier 14-22.5

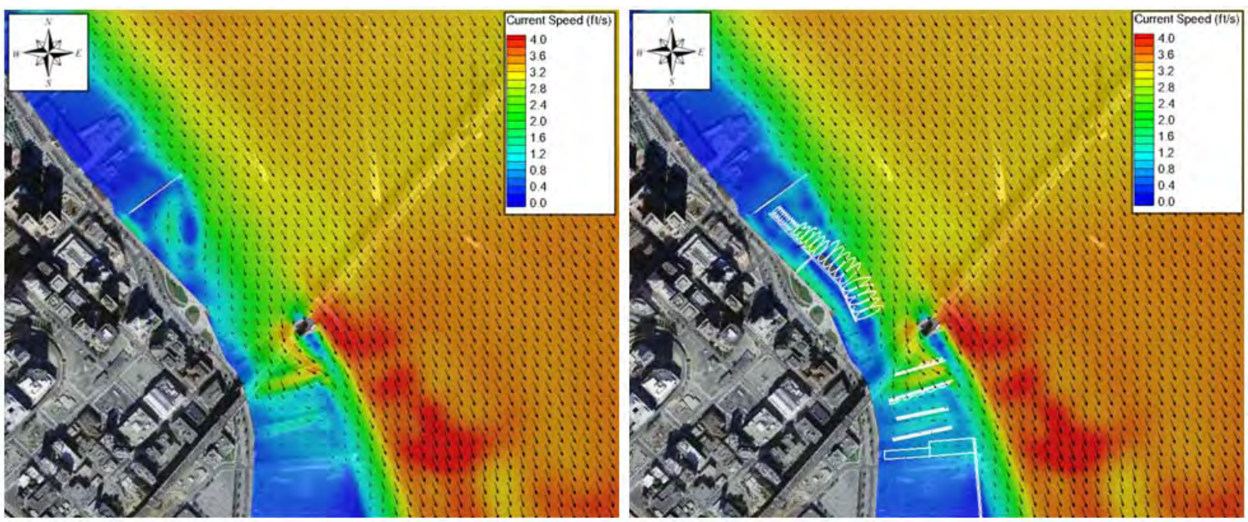

Figure 19. Typical flood depth-averaged velocities for Existing Conditions (left) and AC34 Conditions (right) near Pier 14-22.5

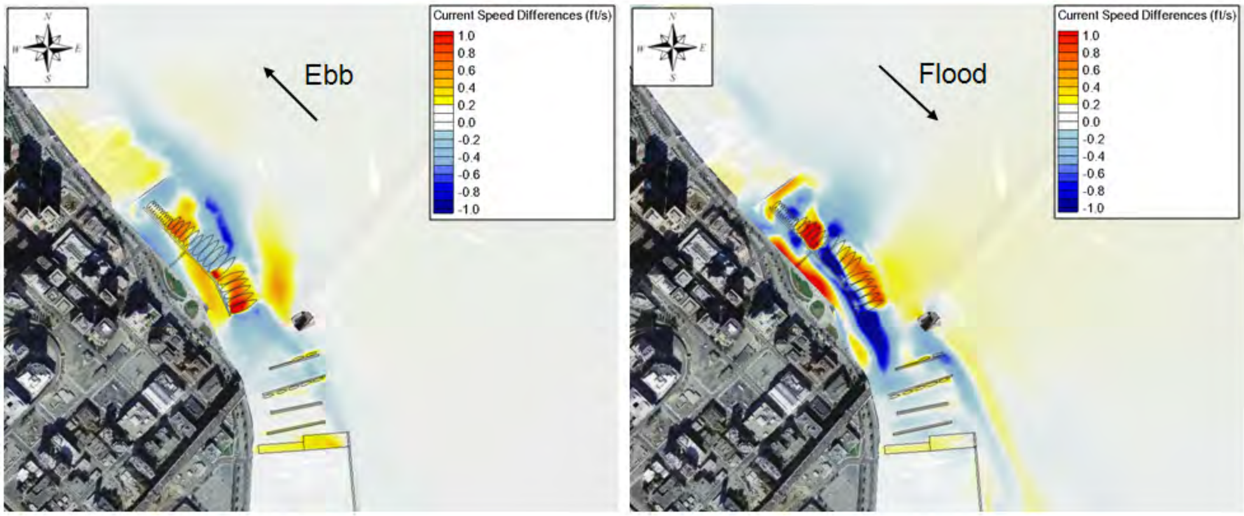

Figure 20. Typical ebb (left) and flood (right) depth-averaged velocity differences near Pier 14-22.5

3.2.4. Pier 26-28 and Pier 30-32

Figure 21 and 22 show typical peak ebb and flood depth-averaged velocities for Existing Conditions (left) and AC34 Conditions (right) near Pier 26-28 and Pier 30-32. Figure 23 shows depth-averaged current velocity differences (AC34 Conditions minus Existing Conditions) in this area (peak ebb, left; peak flood, right).

The velocity patterns surrounding the temporary facilities in this area are modified only slightly, and only within the immediate vicinity of the new structures. The project features at these two areas have relatively low drafts compared to the large boats (with their relatively large drafts) moored at other areas of interest.

The floating wave attenuator system has a small impact on flows due to its location, orientation and relatively small draft. Current velocity differences are less than or equal to 0.7 ft/sec at the location of the temporary facilities, and are smaller than 0.1 ft/sec at a distance of approximately 100-300 ft from the temporary facilities. These distances are smaller than the dimensions of the proposed facilities themselves.

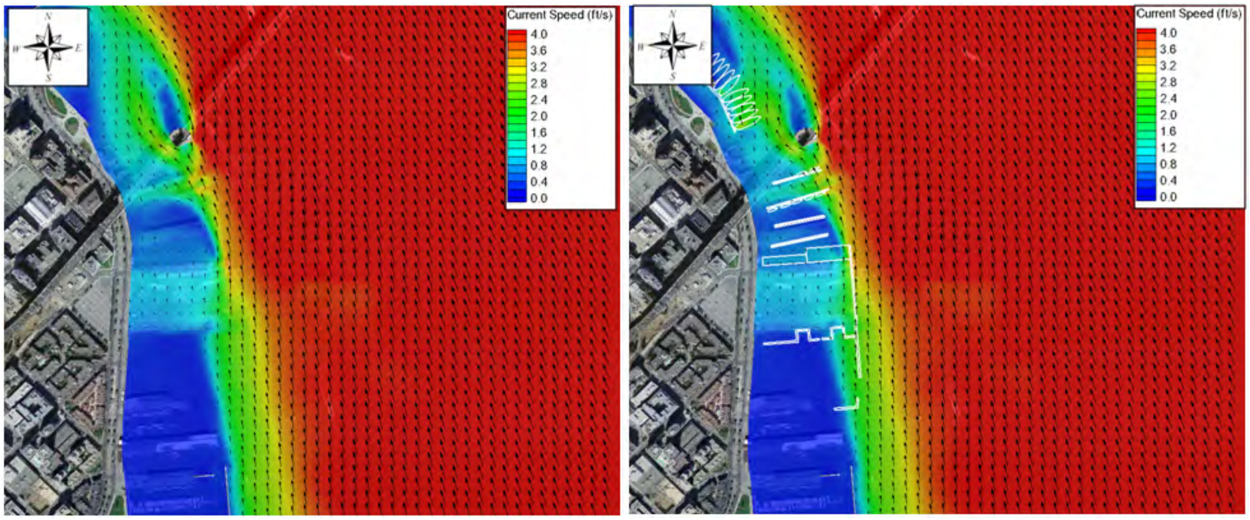

Figure 21. Typical ebb depth-averaged velocities for Existing Conditions (left) and AC34 Conditions (right) near Pier 26-28 and Pier 30-32

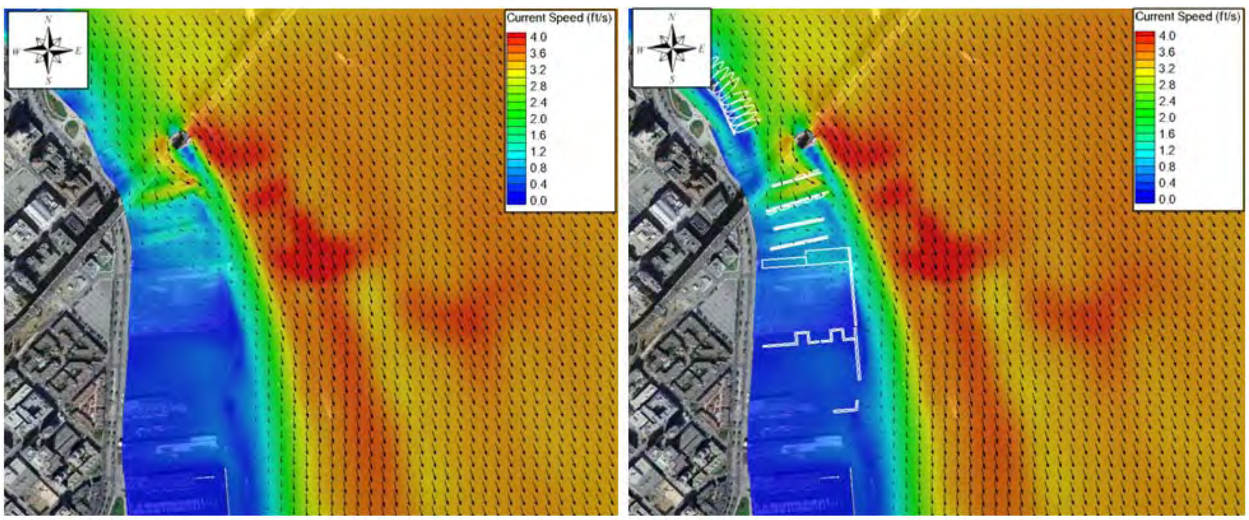

Figure 22. Typical flood depth-averaged velocities for Existing Conditions (left) and AC34 Conditions (right) near Pier 26-28 and Pier 30-32

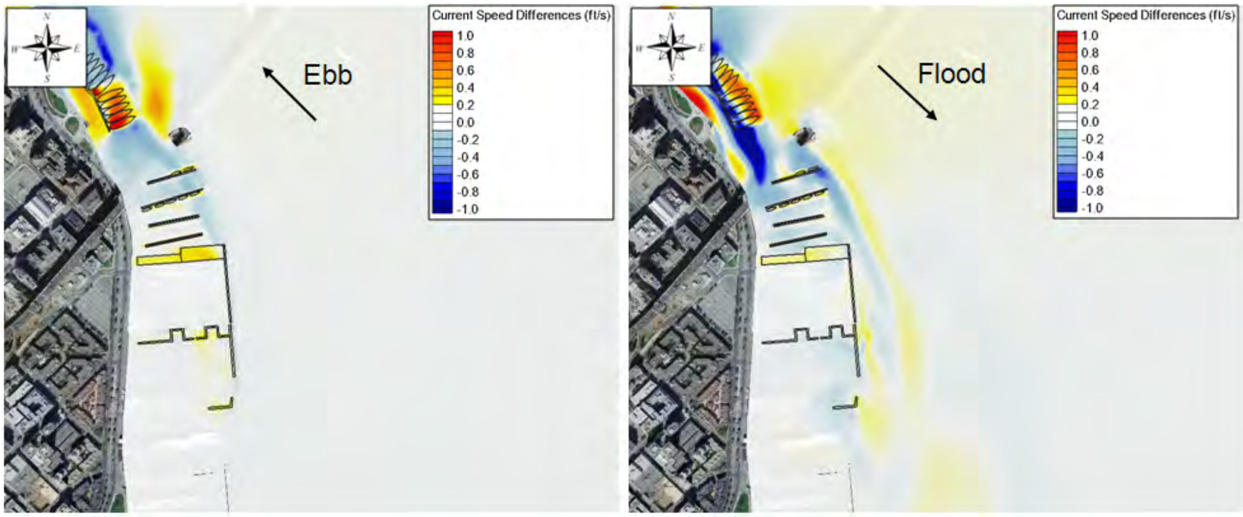

Figure 23. Typical ebb (left) and flood (right) depth-averaged velocity differences near Pier 26-28 and Pier 30-32

3.2.5. Pier 80

Figure 24 and 25 show typical peak ebb and flood depth-averaged velocities for Existing Conditions (left) and AC34 Conditions (right) at Pier 80. Figure 26 shows depth-averaged current velocity differences (AC34 Conditions minus Existing Conditions) at Pier 80. Hydrodynamic modeling results predict very low current velocities in the Islais Creek Channel, a confined channel that is normal to the prevailing Bay tidal flows.

Current velocity differences caused by the floating concrete docks in the channel at Pier 80 are negligible even at the location of the temporary facilities due to the very small ebb and flood tidal currents. It should be noted that Pier 80 was assumed to be pile-supported with flows underneath, which results in a conservative evaluation of potential impacts.

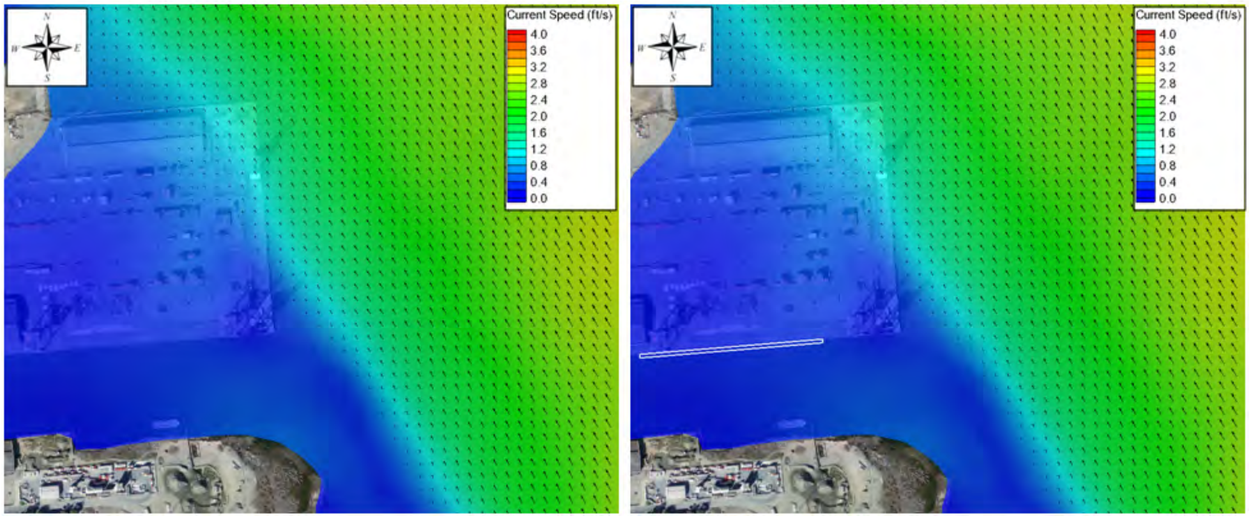

Figure 24. Typical ebb depth-averaged velocities for Existing Conditions (left) and AC34 Conditions (right) at Pier 80

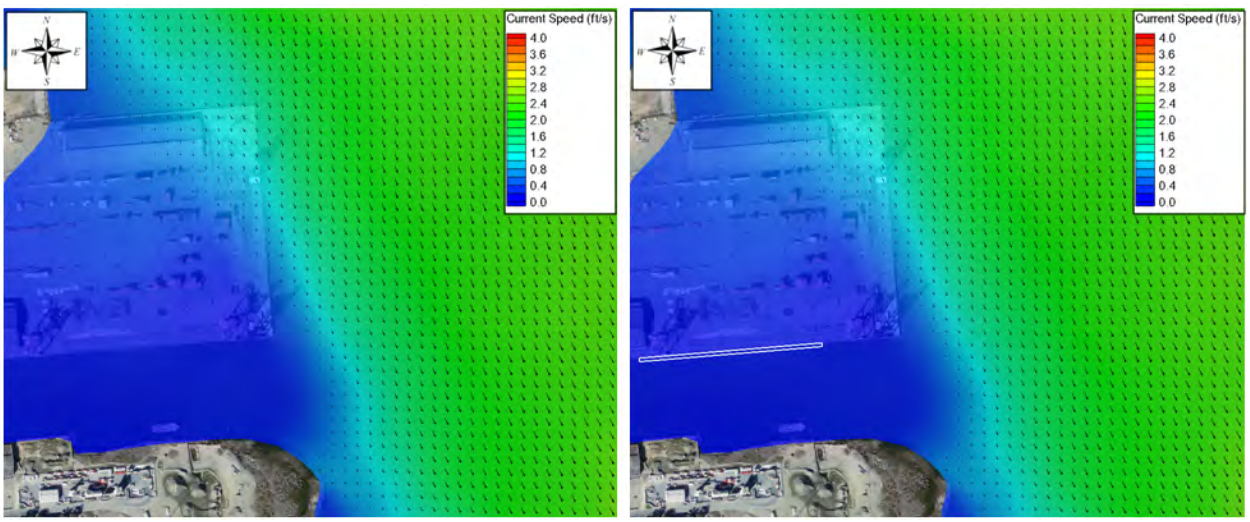

Figure 25. Typical flood depth-averaged velocities for Existing Conditions (left) and AC34 Conditions (right) at Pier 80

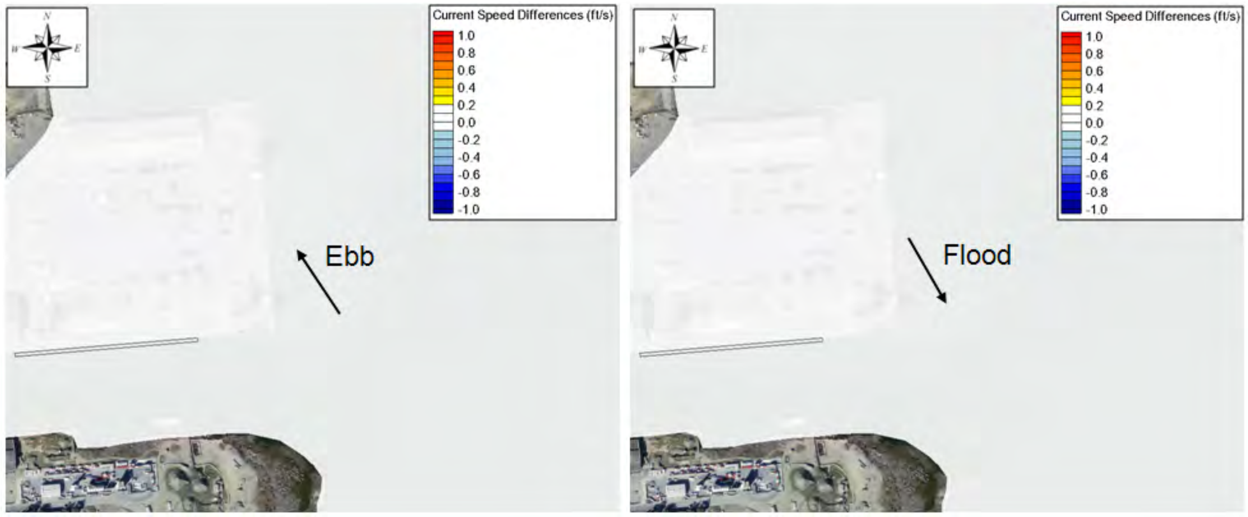

Figure 26. Typical ebb (left) and flood (right) depth-averaged velocity differences at Pier 80

4. Conclusions

CHE performed coastal engineering analysis as part of the EIR for the 34th America's Cup in San Francisco Bay, CA. The analysis included numerical modeling of Bay tidal flows, and evaluation of potential changes in tidal flows and water levels caused by the temporary facilities.

Results of the analysis indicate that the proposed temporary in-water facilities evaluated in the analysis, which included floating concrete docks, wave attenuators and moored boats, are likely to cause changes in Bay current circulation in the immediate vicinity of the facilities themselves, and only during stronger currents. At times of low currents, changes are expected to be negligible.

Along the San Francisco waterfront, sediment transport, salinity and water quality are driven almost entirely by tidal currents. Therefore any potential changes in these factors caused by the installation of the AC34 temporary facilities is also expected to be confined the immediate vicinity of the facilities. Winds and wind-waves which are also present along the waterfront are known to cause mixing, and hence can be expected to further reduce the potential impacts of the proposed facilities on the Bay hydrodynamics, sediment transport, salinity and water quality in general.

5. References

Kivva, S.L, Kolomiets, P.S., Shepeleva, T.V. and M.J. Zheleznyak. 2007. "CHEWPCE–MORPH: A Numerical Simulator for Depth-Averaged Surface Water Flow, Sediment Transport and Morphodynamics in Nearshore Zone." Version 2.0.

APPENDIX A

Model Validation

Appendix A: Model Validation

The MORPHO model has been validated using numerous field and laboratory data sets. This appendix provides results of validation using NOAA current data in northern San Francisco Bay, as well as a "stopwatch validation" at Pier 27. Figure A1 shows the measured and MORPHO depth-averaged current speeds at the Richmond gauge (at Richmond-San Rafael Bridge) during a 5-day period in December 1999, as well as the predicted (NOAA) and model (MORPHO) tidal fluctuations at the Point San Pedro Station. Both validation methods show that the MORPHO model is a reliable tool for analysis of tidal currents along the San Francisco waterfront.

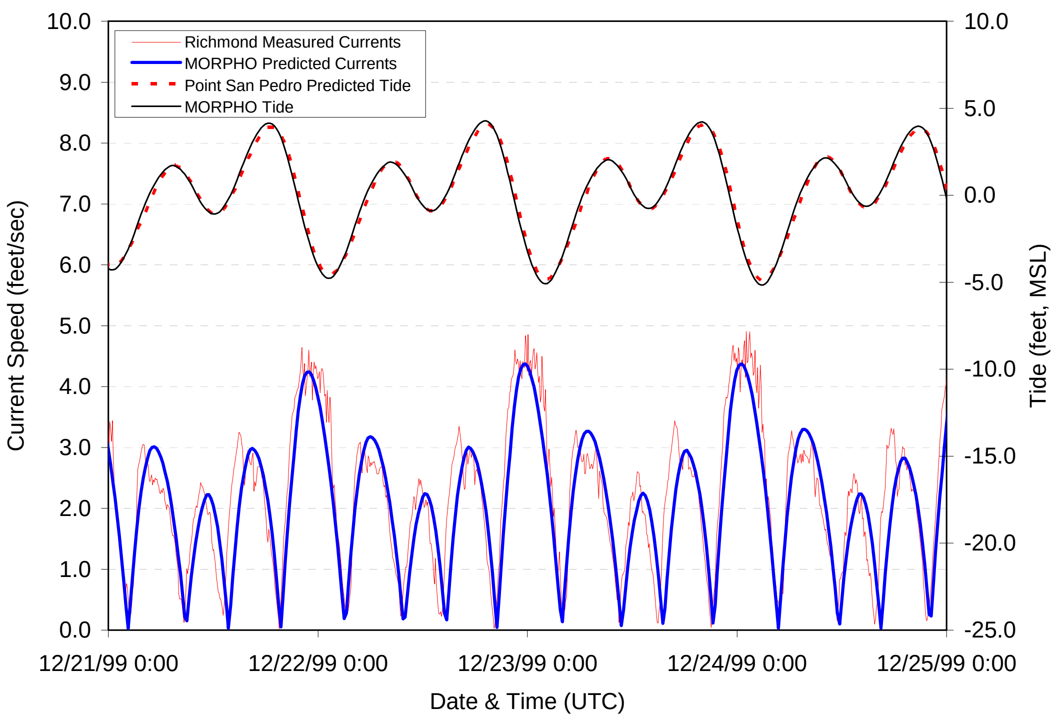

Figure A1. Measured and predicted (MORPHO) tides and currents at Richmond gauge and Point San Pedro gauge (NOAA)

Validation of the MORPHO model was also performed using a stopwatch validation at Pier 27. The stopwatch validation consisted of comparing MORPHO surface velocities with surface velocities observed at Pier 27 on February 12, 2010. Figure A2 shows the location of the stopwatch validation measurements and Figure A3 shows a comparison of the observed and predicted currents and tides. The MORPHO model provides a good representation of the strong and complex currents at the seaward end of Pier 27.

Figure A2. Location of "stopwatch validation" at Pier 27

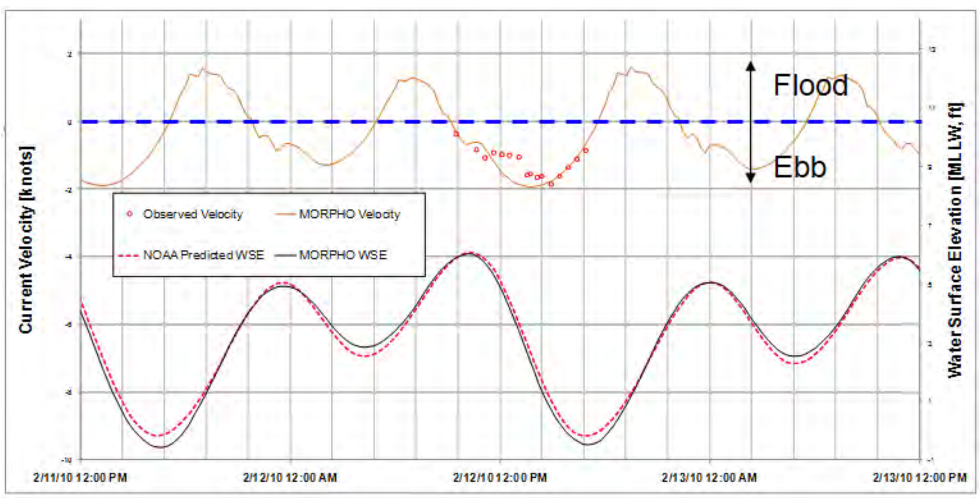

Figure A3. Results of "stopwatch validation" at Pier 27