APPLICATION FOR WATER QUALITY CERTIFICATION

FOR THE

SAN FRANCISCO – OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

PROJECT PROPONENT:

CALIFORNIA DEPARTMENT OF TRANSPORTATION

SEPTEMBER 2001

CONTENTS

SECTION 1

APPLICATION FOR WATER QUALITY CERTIFICATION AND/OR WAIVER OF WASTE DISCHARGE REQUIREMENTS

AND

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) STATUTORY EXEMPTION

STATE OF CALIFORNIA – CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

SAN FRANCISCO BAY REGIONAL WATER QUALITY CONTROL BOARD

1515 CLAY STREET, SUITE 1400
OAKLAND, CALIFORNIA 94612

APPLICATION FOR WATER QUALITY CERTIFICATION AND/OR WAIVER OF WASTE DISCHARGE REQUIREMENTS

1. APPLICANT'S NAME	4. AUTHORIZED AGENT'S NAME AND TITLE (An agent is not required)
California Department of Transportation	**Paul Hensley, Deputy Director/Program Manager Toll Bridge Program**
2. APPLICANT'S ADDRESS	**5. AGENT'S ADDRESS**
111 Grand Avenue P.O. Box 23660 Oakland, CA 94623-0660	**Not Applicable (N/A)**
3. APPLICANT'S PHONE NOS. WITH AREA CODES	**6. AGENT'S PHONE NOS. WITH AREA CODE**
(510) 286-6250	N/A

7. STATEMENT OF AUTHORIZATION

I hereby authorize to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information to support of this permit application.

N/A

APPLICANT'S SIGNATURE DATE

NAME, LOCATION AND DESCRIPTION OF PROJECT OR ACTIVITY

8. PROJECT NAME OR TITLE (See instructions)

San Francisco-Oakland Bay Bridge East Span Seismic Safety Project (East Span Project)

9. NAME OF AFFECTED WATERBODY (See instructions)

San Francisco Bay

10. PROJECT STREET ADDRESS (If applicable)

No Address

11. LOCATION OF PROJECT

City and County of San Francisco
Alameda County/City of Oakland
COUNTY CITY/TOWN

12. OTHER LOCATION DESCRIPTIONS (Latitude and Longitude, river mile, etc. See instructions)

On Interstate 80 crossing San Francisco Bay. (04-SF-80 KP 12.2/KP 14.3, 04-ALA-80 KP 0.0/KP 2.1)
37 49' 10" N 122 20' 35" W

13. DIRECTIONS TO SITE

Interstate 80, west from Oakland. Interstate 80 east from San Francisco.

14. DESCRIPTION OF ACTIVITY AND ENVIRONMENTAL IMPACTS (Describe the project, including all features and estimated time schedule. Summarize environmental effects, including any impacts to beneficial uses of water. See instructions)

See Block 14 in Section 2

15. PROJECT PURPOSE (Describe reason or purpose for the project. See instructions)

See Block 15 in Section 2

USE BLOCKS 16-20 IF FILL AND/OR DREDGED METERIAL IS TO BE DISCHARGED TO A WETLAND OR OTHER JURISDICTIONAL WATER BODY

16. REASON FOR DISCHARGE

See Block 16 in Section 2

17. TYPES OF MATERIAL BEING DISCHARGED

Clean fill, concrete, steel, riprap, and approved dredged materials.

18. AMOUNT OF MATERIAL BEING DISCHARGED

See Block 18 in Section 2

19. SURFACE AREA IN ACRES OF WETLANDS OR OTHER WATERS FILLED. (See instructions)

See Block 19 in Section 2

20. MITIGATION (Describe the size, type and functional values of the mitigation. See instructions)

See Block 20 in Section 2

21. HAS ANY PORTION OF THE WORK BEEN INITIATED? YES NO IF YES, DESCRIBE THE WORK INITIATED:

No

22. ADDRESS OF ADJOINING PROPERTY OWNERS, LESSEES, ETC., WHOSE PROPERTY ADJAOINS THE WATERBODY

See Block 22 in Section 2

23. List other certifications/denials received from other federal, state or local agencies (such as CDFG, USFWS, ACOE, BCDC, or Coastal Commission) for work described in this application, including, but not restricted to zoning, building, flood plain, and BCDC permits; streambed alteration agreements; and any other permits or orders from the SFBRWQCB.

AGENCY	TYPE OF APPROVAL	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED

See Block 23 in Section 2

24. California Environmental Quality Act (CEQA) Compliance documentation provided: [YES] NO EIR NEGATIVE DECLARATION CATEGORICAL EXEMPTION
(See Attached Notice of Exemption)

25. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein and am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE
	9/12/01		9/12/01

The application must be signed by the person who desires to undertake the proposed activity (applicant) or duly authorized agent if the statement in block 7 has been filled out and signed.

NOTICE OF EXEMPTION

To: ☑ Office of Planning and Research
1400 Tenth Street, Room 121
Sacramento, CA 95814

☐ County Clerk
County of

From: State of California
Department of Transportation
Environmental Planning, South
P.O. Box 23660
Oakland, CA 94623-0660

Project Title: San Francisco-Oakland Bay Bridge East Span Seismic Safety Project

Project Location - Specific: Interstate 80 between Yerba Buena Island and the Oakland shore

Project Location - City: San Francisco and Oakland

Project Location - County: San Francisco and Alameda

Description of Nature, Purpose, and Beneficiaries of Project: The project proposes to seismically retrofit or replace the existing East Span to provide a "lifeline" connection (providing post earthquake relief access) between San Francisco and the East Bay. After implementation of the project, it is expected that the East Span would be able to withstand a maximum credible earthquake on the San Andreas or Hayward faults. It would also bring the East Span up to current roadway design standards for operations and safety to the greatest extent possible. The direct beneficiaries would be users of the East Span. Communities in San Francisco, the San Francisco Peninsula, and the East Bay would benefit after an earthquake due to the East Span project in combination with other seismic safety projects undertaken by Caltrans.

Name of Public Agency Approving Project: California Department of Transportation and the Federal Highway Administration

Name of Person or Agency Carrying Out Project: California Department of Transportation

Exempt Status: *(check one)*

- ☐ Ministerial (Sec. 21080(b)(1); 15268);
- ☐ Declared Emergency (Sec. 21080(b)(3); 15269(a));
- ☑ Emergency Project (Sec. 21080(b)(4); 15269(b)(c));

Reasons why project is exempt: The San Francisco-Oakland East Span Seismic Safety Project is statutorily exempt from the requirements of the California Environmental Quality Act (CEQA) under California Streets and Highways Code Section 180.2 and CEQA Section 21080.

CEQA Section 21080, subdivision (b) sets forth the types of activities that are excluded from CEQA, and paragraph (4) of this subdivision specifically includes actions necessary to prevent or mitigate an emergency. According to the California Streets and Highway Code, as amended, the structural modification of an existing highway structure or toll bridge (Section 180.2 (a)); and the replacement of a highway structure or toll bridge within, or immediately adjacent to an existing right-of-way (Section 180.2 (b)) shall be considered to be activities under subdivision (b), paragraph (4).

Lead Agency Contact Person: Tony Anziano
Area Code/Telephone/Extension: 415/982-3130

If filed by applicant:

1. Attach certified document of exemption finding.
2. Has a Notice of Exemption been filed by the public agency approving the project?

☑ Yes ☐ No

Signature: Harry G. Yahata Date: 9/18/98 Title: DISTRICT DIRECTOR

Date received for filing at OPR:

SECTION 2

BLOCKS 14 – 23

BLOCK 14

DESCRIPTION OF ACTIVITY AND ENVIRONMENTAL IMPACTS

PROJECT DESCRIPTION

The California Department of Transportation (Caltrans) proposes to replace the East Span of the San Francisco-Oakland Bay Bridge (East Span Project). The project would be located on Interstate 80 between the cities of San Francisco and Oakland (see Figure 1 in Section 4). The western project limit is the eastern portal of the Yerba Buena Island (YBI) tunnel located in San Francisco; however, project related traffic controls may extend to the western portal of the YBI tunnel and project signage may extend to the western approach of the West Span in San Francisco. The eastern project limit is located approximately 1,312 feet (400 meters) west of the Bay Bridge Toll Plaza on a spit of land referred to as the Oakland Touchdown area in the City of Oakland (See Figure 2 in Section 4). The project site also includes the waters of San Francisco Bay adjacent to the bridge and on the north and east sides of YBI and the Oakland Touchdown area.

The new bridge would be constructed north of the existing East Span and would be approximately 2.18 miles long (3.5 kilometers long) and approximately 230 feet wide (70 meters wide), including a 50-foot (15.3-meter) minimum space between the east and westbound bridge decks. The bridge decks would be side-by-side, except for the double deck portion between the existing YBI tunnel and the transition structures where the double deck structure becomes two parallel structures. Each deck would consist of five traffic lanes and inside and outside shoulders. The traffic lanes would be 12 feet wide (3.6 meters wide) with 10-foot-wide (3.0-meter-wide) shoulders. A bicycle/pedestrian path would be constructed on the south side of the eastbound structure and would be 15.5 feet wide (4.7 meters wide). The bicycle/pedestrian path would be located 1 foot (0.3 meters) above the roadway grade and would be separated from traffic by the roadway shoulder, a safety barrier and a railing. The distance between the edge of the bridge deck and the path would vary from approximately 17 inches (43 centimeters) to 10 feet (3 meters) depending on the bridge segment. The bicycle/pedestrian path would extend from the eastern approach in Oakland to the western terminus of the East Span on YBI in San Francisco.

The East Span Project would also replace the eastbound on-ramp on YBI. The existing ramp needs to be dismantled to construct the new bridge. The ramp would be rebuilt and would meet current design and safety standards.

NEW BRIDGE CONSTRUCTION

The East Span Project would take seven years to complete, including two years to remove the existing East Span. However, seismic safety and lifeline criteria would be achieved for westbound traffic four years after the start of construction and, for eastbound traffic, five years after the start of construction. Construction is scheduled to begin in early 2002 and targeted for completion in early 2009.

The new structures and roadway consist of a viaduct from the YBI tunnel to a self-anchored suspension span (SAS), the SAS or main span, a skyway from the SAS to the Oakland approach, and a geotechnical approach embankment and roadway at the Oakland Touchdown (see Figure 3 in Section 4). The structures would be supported by 25 piers over water and 19 bents set on YBI and the Oakland Touchdown area. Construction of the new bridge would be divided among four separate contracts including the SAS/YBI Contract (which includes YBI transition and the main span), the Skyway Contract, the Oakland Approach Structures Contract, and the Geofill Contract at the Oakland Touchdown. In addition, there would be a demolition contract to remove the existing bridge. A construction schedule by contract is included as Appendix E. The schedule; however, is for planning purposes only. The actual schedule would be determined after contract award by the selected construction contractors.

The project would require the use of large-scale equipment and involve labor-intensive activities. Materials and equipment would arrive to the site by land (truck) and by water (boat and barge). Depending on the location, timing, and size of the deliverables, they could be moved into position by land and/or barge mounted cranes. Work crews would arrive by vehicle and by boat depending on location. Temporary access trestles, which may be built on or in close proximity to YBI and the Oakland Touchdown area, would also be used for delivery of materials. These structures would likely have timber, steel, or concrete driven foundations and timber, steel, or concrete decks, depending on their exact use and the materials selected by the contractor. The access trestles would be designed by the contractor.

For land-based support structures (bents), pre-mixed concrete could be delivered by truck and dumped or pumped into place, or mixed on-site at batch plants, transported by truck and dumped or pumped into place. For in-Bay structures (piers), concrete would be delivered to docked barges, placed on barges for batching and transport, and then dumped or pumped into place.

Excavators, backhoes, haulers, graders, and other large-scale earth moving and construction equipment would be used to clear and excavate portions of the site on YBI and the Oakland Touchdown. Excavated material would be stockpiled for reuse or removed from the site by truck or barge for disposal.

Dredging in-Bay near the Oakland Touchdown area would also be required for the project. Dredging would provide adequate clearance for barge access during construction of the new bridge and dismantling of the existing bridge. Dredging would also be required to excavate and remove sediment at individual pier locations for construction of the new bridge. Dredging equipment (e.g., clamshells dredges and backhoes) would be used to remove sediments and the material would be transported from the site by barges for disposal or reuse. See Appendix H for dredging and disposal details.

Temporary Detours at YBI

Except for delivery of materials and personnel, the main span and skyway would be constructed without interrupting traffic on the existing East Span. However, temporary detours would be required on YBI to route traffic around work areas.

The temporary westbound detour would be 1,607 feet long (490 meters long) and constructed north of the existing East Span, while the temporary eastbound detour would be 1,574 feet

long (480 meters long) and constructed south of the existing East Span. Both west and eastbound detour structures would be approximately 56 feet wide (17 meters wide) with five 11-foot-wide (3.4-meter-wide) lanes in each direction. The temporary detours would be operational for approximately two years; however, it would be approximately four years between the beginning of construction and the dismantling of the temporary detours. The temporary detours could be removed as soon as they are no longer needed to carry traffic or as one of the last steps of bridge construction, depending on whether the contractor chooses to use them as platforms from which to construct other portions of the bridge.

Substructure Construction
Creating access to construct footings would require grading the area surrounding the temporary detours and excavating up-slope near the tunnel portal on YBI. Sheet pile, soldier piles, tie backs, and/or other temporary shoring may be used to stabilize excavated slopes.

For construction of the bents, piles would be driven into bearing soil strata to achieve required capacity on YBI, forms would be built for pile caps or spread footings; the forms would be filled with reinforcing steel and concrete and removed after the concrete has cured. The towers and bent caps would then be erected using cranes to lift and fit manufactured sections together. Temporary supports may be used during construction to keep the bent towers in a vertical position.

Superstructure Construction
Steel girders would be raised by crane, forms would be built for laying the deck, reinforcing steel and concrete would be placed in the forms, and the forms would be removed after the concrete has cured. Construction of the roadway barriers would follow the same sequence and be followed by the installation of signage.

Temporary Detours at the Oakland Touchdown Area

At the Oakland Touchdown area, an eastbound temporary detour would be built at-grade, south of the existing eastbound lanes, requiring relocation of the existing Caltrans maintenance road. The detour and maintenance road relocation would require a temporary construction easement from the City of Oakland. Following construction of the eastbound approach and structure, eastbound traffic would shift from the temporary detour onto the new structure, and the Caltrans maintenance road would be realigned. Temporary detours would not be required for construction of the westbound approach and structure.

Transition Structures at YBI

At Bent 48 on YBI, the new bridge would begin with transition structures that would move from the double-decked structure into two parallel structures. The structures would be prestressed, concrete box-girders.

Substructure Construction
Creating access for footings, driving piles to bearing strata, and construction of the pile caps would require the same construction methods as the temporary detours (see above).

To construct the piers, forms would be constructed, reinforcing steel would be placed in the forms, concrete would be cast into the forms, and the forms would be removed after the concrete has cured.

Superstructure Construction
Deck forms would be built, reinforcing steel would be placed in the forms, concrete would be cast into the forms, and the forms would be removed after the concrete has cured and the prestressing placed. Construction of the roadway barriers would follow the same sequence as that of the deck forms and then signage, utilities and pre-stressing cables would be installed.

Main Span

The main span, located between Pier W2 on YBI and Pier E2 on the eastern side of the main navigation opening, would be a steel deck, self-anchored suspension bridge design.

Main Tower Construction
The main tower would be set offshore from YBI. Bay bottom sediments would be removed, holes would be drilled into bedrock, hollow steel pipe piles would be driven or socketed into the holes, and a pre-fabricated steel box (with concrete cover) pile cap would be floated into position and sunk onto the piles, sealed around them, and pumped dry. The piles would be filled with concrete and welded to the pile cap, which would be filled with reinforcing steel and concrete, and covered with a top slab. Precast concrete fenders would be brought to the site and attached to the pile cap. The slab would provide the surface on which four pre-fabricated steel tower legs would be erected. The legs would be raised by cranes and bolted together. Steel link beams would be bolted between the legs along their length. Temporary support piers may be placed in the Bay and on either side of the permanent main tower during its construction. Depending on methods selected by the contractor, cofferdams may be used during construction of the main tower foundation; however, it is unlikely due to water depths at this location.

All removed sediment would be placed on a barge for transport and disposed of per DMMO recommendations.

Pier E2 Construction. Hollow steel pipe piles would be driven into Young Bay Mud and a pre-fabricated steel box (with concrete cover) pile cap would be floated into position and sunk onto the piles, sealed around them, and pumped dry. The piles would be filled halfway with concrete and welded to the pile cap, which would be filled with reinforcing steel and concrete, and covered with a top slab. All sediments within the piles resulting from pile driving would be removed, placed on a barge for transport, and disposed. See Appendix H for dredging and disposal details.

Pier W2 Construction. Rock on YBI would be removed mechanically, and the rock faces stabilized or retained. The pile holes would be drilled deeper into the rock. The holes may have to be dewatered. A concrete reinforcing cage would be placed in the pile holes, and the hole filled with concrete. The pile cap would be formed, a reinforcing cage would be placed, then the forms filled with concrete. The forms would be removed after the concrete cures.

Construction of both piers above the pile caps would include constructing forms, placing reinforcing steel and concrete in the forms, and removing the forms once the concrete has cured. The process would be the same for the pier caps; however, the pier caps would be prestressed. Tie-down cables would be placed between the pile cap and pier cap to anchor the pier.

Superstructure Construction

Temporary falsework on piles would be constructed between Pier W2 and the main tower. Two temporary towers would be constructed between the main tower and Pier E2. There would be falsework on the island as well to support the superstructure while it is being constructed. Pre-fabricated steel segments of the superstructure would be delivered to the site by barge and lifted onto the falsework and the temporary towers. Each segment would then be connected to the adjacent segments. Completed portions of the deck could be used as working platforms for other construction activities including delivery of materials and equipment and lifting and positioning of structural components.

Suspension cables would then be lifted and placed between the top of the main tower and each side of the bridge. Cable suspenders would then be hung from the suspension cable and connected to the deck. After the suspension cables and suspenders are stressed and positioned, the falsework and temporary towers would be removed, the barriers and riding surface overlay would be placed, and utilities, lighting and signs would be installed.

Skyway

The skyway would be a prestressed, concrete box-girder.

A temporary access trestle may be utilized to build portions of the skyway and allow for the delivery of materials, equipment, and work crews. It is expected that the trestle would be used in conjunction with the barges in areas of shallow water. The trestle for the skyway would be approximately 75,350 square feet (7,000 square meters). Barges may support the heavier equipment.

Substructure Construction

Construction of the piles and the pile caps would be similar to construction of Pier E2. All sediments within the piles resulting from pile driving would be removed, placed on a barge for transport, and disposed. See Appendix H for dredging and disposal details. Depending on methods selected by the contractor, cofferdams may be used.

Near the Oakland approach, cofferdams may be required. The cofferdam would be placed, sediment excavated, and the cofferdam dewatered. The steel pipe piles would be driven to the Alameda formation. A steel box pile cap would be lowered onto the piles and welded to them. If necessary, the piles would be emptied of Bay sediments then the piles and pile caps would be filled with reinforced concrete.

The pier forms would be placed, filled with reinforcing steel and concrete, then removed once the concrete is cured. The pier caps would be constructed similarly. Once the pier is complete, the cofferdams would be removed either fully or to at least 1.5 feet (0.46 meter) below the mudline.

Where the new structure is in close proximity to the existing East Span, the contractor would have to ensure the existing structure foundations remain stable. This may require placing a stabilizing system (such as sheet piling) in the Bay. When the pile cap construction is complete, the stabilizing system would be removed either fully or to at least 1.5 feet (0.46 meter) below the mudline.

Precast Superstructure Construction
All sections of the deck would be cast off-site, delivered to the site by barge, lifted by cranes, placed on alternating sides of the pier for balance, and attached to the previous segment with prestressing cable. When the sections meet in the mid-span, they would be jacked together and either joined with prestressed concrete or a mechanical expansion hinge. The barriers and the riding surface overlay would be constructed in a sequence similar to that of the main span, after which utilities, lighting, and signage would be installed.

Cast-in-place Superstructure Construction
A form traveler would be lifted and secured to the pier table. Steel reinforcing would be placed inside the form. Concrete would be delivered and poured. After the concrete cures, the prestressing cable would be placed, then the form traveler would be moved out over the new section to form the next section. When the sections meet in mid-span, they would be jacked together and either joined with prestressed concrete or a mechanical expansion hinge.

Temporary Towers
Pile-supported temporary towers would be placed by the skyway contractor where the skyway joins the main span and Oakland approach. These towers would support the skyway until the adjoining structures are complete. Once the main span and Oakland approach are complete and all structures are joined, the temporary towers would be removed.

Oakland Approach Structures

The Oakland approach structures would include a cast-in-place, prestressed, concrete box-girder supported by a cast-in-place, reinforced, concrete substructure. A temporary access trestle would be utilized to facilitate construction and would be approximately 150,700 square feet (14,000 square meters).

Substructure Construction
Construction in-Bay would include dredging for barge access, building a temporary access trestle, driving piles, and placing cofferdams in areas of shallow water near the Oakland Touchdown. The cofferdam method would involve driving sheet piles into Young Bay Mud to isolate a working area that would be dredged and dewatered to create access for construction of footings. All sediments resulting from pile driving and dredging would be removed, placed on a barge for transport, and disposed. See Appendix H for dredging details.

Construction on land would include excavation at footings and driving piles. The sequence to construct the pile caps and the piers and bents above the pile caps would be similar to the sequence followed to construct the pile caps and the bents of the transition structures (see above).

Where the new structure is in close proximity to the existing East Span, the contractor would have to ensure the existing structure foundations remain stable. This may require placing a stabilizing system (such as sheet piling) in the Bay. When the pile cap construction is complete, the stabilizing system would be removed either fully or to at least 1.5 feet (0.46 meter) below the mudline.

Superstructure Construction
The construction sequence to build the bridge decks of the skyway would be the same as for the transition structure (see above). Construction of the roadway barriers would be in the

same sequence and be followed by the installation of signage, utilities, and prestressing cables after the concrete has cured (see above).

Additional Oakland Touchdown Area Activities

At the Oakland Touchdown area, a portion of the new westbound roadway and the relocated maintenance road would encroach into the Bay, requiring use of engineered fill and surcharge in the Bay and upland areas.

For construction of the westbound roadway, a geotube would be placed in tidal areas north of the Oakland Touchdown area, along a distance of approximately 1,970 feet (600 meters), to temporarily protect the work area from tidal and wave action and to facilitate installation of wick drains and the placement of fill. A geotube is a large diameter tube of permeable geotextile fabric into which Bay sand and water would be pumped. When the geotube is filled, it would act as a tidal barrier to protect the work area (see Figure 4 in Section 4).

Within the area protected by the geotube the existing soils would be excavated to an elevation of approximately –2.6 feet (-0.8 meters). Wick drains and vertical drains would be installed and evenly distributed throughout the excavated area to facilitate consolidation of underlying bay mud and prevent liquefaction of overlying sand. The drains would be covered with a layer of gravel upon which clean fill material would be placed. The fill is referred to as “surcharge material.” The weight of the surcharge material on the underlying bay mud would force the pore water in the substrate up through the wick drains. The wick drains reduce the distance the pore water has to travel to reach a more permeable flow path, which reduces the time required to consolidate the bay mud. The vertical drains would also convey some pore water during the surcharge period. However, they are primarily to provide a drainage path for pore water during a seismic event. The water that drains from the substrate through the wick drains and vertical drains would flow through the gravel blanket to the Bay.

Runoff from the surface of the fill would drain to existing and temporary drainage features and would be subject to Storm Water Pollution Prevention requirements and standards. Best management practices (BMPs) that would be used include, but are not limited to temporary slope drains, erosion control blankets, and fiber rolls. When the substrate has been drained and compacted by the weight of the surcharge material, a portion of the surcharge would be removed and the road surface would be constructed upon the remaining fill. The excess surcharge material would be removed to an upland site for reuse.

DISMANTLING OF THE EXISTING BRIDGE

Dismantling activities would consist of seven major stages, which represent major components of the existing bridge and construction-related structures, including:

- YBI viaduct;
- YBI 288-foot (88-meter) steel truss approach spans;
- Oakland approach structures;
- YBI temporary detours;
- Cantilever truss spans;

- 504-foot (154-meter) steel truss spans; and
- 288-foot (88-meter) steel truss spans.

The YBI viaduct, the YBI steel truss approach spans, the Oakland approach structures, and the YBI temporary detours would be dismantled during construction of the replacement bridge because of construction staging. The temporary detours could be removed as soon as they are no longer needed to carry traffic or as one of the last steps of bridge construction, depending on whether the contractor chooses to use them as platforms from which to construct other portions of the bridge. The three remaining sections would be dismantled under separate contracts.

Dredging

Some areas near the Oakland Touchdown are too shallow to accommodate barges to dismantle the existing bridge; thus, a barge access channel would need to be dredged. The suitability of sediments in the barge access channel for dismantling the existing bridge would be evaluated prior to disposal per the Dredged Material Management Office's (DMMO) recommendation. See Appendix H for dredging information.

After dismantling the superstructure, the bridge foundations would be removed to an elevation of at least 1.5 feet (0.46 meter) below the mudline. This would require the removal of sediments around the footings through the use of cofferdams. Techniques such as reverse circulation drilling, jetting, and air lifting may be used by the contractors to remove the material around the footings. These methods would involve creating a slurry of material within the cofferdam and lifting or pumping it into the drilling vessel or barge. The concrete from the dismantled footings would be removed and transported by barge or truck to a predetermined site for reuse, recycling, or disposal. Existing piles would be cut off to an elevation at least 1.5 feet (0.46 meter) below the mudline. Once the cofferdams are removed, natural sedimentation would fill the area surrounding the cut-off-piles.

Superstructure

Removal of decks could be performed by cutting them into pieces or by disassembling them panel-by-panel. Truss spans near the Oakland shore may be removed by conventional barge and crane methods due to the shallow water and low clearance under the deck. Options include constructing temporary supports under the span and disassembling the truss segment by segment, dredging for barge clearance, constructing temporary embankments of engineered fill within the Bay for access, or using special shallow-draft barges or rigging devices for lowering sections onto barges from the bridge deck. Protective measures would be taken to prevent materials or debris from falling into the Bay. Depending on location, materials could be removed by barge or truck to a predetermined site for reuse, recycling, or disposal.

Substructure

Substructure elements could be lifted from their bases in one piece or piece by piece. Dismantling of concrete foundations would require reducing the reinforced concrete to pieces small enough to be hauled away, which could be done by mechanical means such as saw

cutting, flame cutting, mechanical splitting, or pulverizing and hydro-cutting. The hollow interiors of the piles remaining below the mudline could also be used as receptacles for pieces of concrete as the pier above is dismantled. This method would substantially reduce the quantity of material requiring transport and disposal and would lower dismantling costs. The piles remaining below the mudline could be capped or would gradually fill in through siltation. Any reinforcing steel would be cut off to be flush with the face of the concrete that remains below the mudline.

Removal of the piles to 1.5 feet (0.46 meter) below the mudline could be completed by an underwater dismantling method or by constructing cofferdams at each pier. The use of cofferdams at YBI would depend on methods selected by the contractor, however their use is assumed for purposes of estimating dredged quantities generated by existing bridge removal.

CONTAMINATED SOIL

Some areas within the project limits have been identified as having contamination due to underground storage tank leaks, lead-based paint removal, landfilling operations, and other industrial activities. Investigation of soil that would be excavated for the project is being finalized and soils would be characterized for disposal at appropriate upland disposal sites.

TEMPORARY DEWATERING

During construction of the foundation structures, dewatering may be required from cofferdams, pile shafts, and upland excavations. Water removed from cofferdams and marine-based piles would be filtered to remove suspended solids and the receiving water would be monitored for turbidity and discoloration. Discharges would not be allowed to increase the turbidity of the receiving water by more than ten percent.

In some cases the foundation construction may occur within areas of petroleum-contaminated ground water resulting mainly from diesel fuel leaks. If ground water is encountered during the foundation construction and dewatering is required in these locations, the water would be contained, analyzed, and treated, if necessary, prior to discharge. Treatment would include removing settleable solids in a holding tank and removing petroleum compounds by filtration though granulated activated carbon. The water would be treated to conform to State standards before being discharged back into the Bay. In addition, excavations would be sealed to minimize further contaminant transport due to drawdown.

During the time the geotube is in place, there may be instances when water accumulating behind the geotube would need to be pumped over the barrier to the Bay. The discharge would include groundwater from the wick drains and vertical drains, Bay water infiltrating from below and through the geotube, and storm water. Analysis of groundwater samples from both the shallow and deep water-bearing zones within the influence of the wick drains and vertical drains did not detect contaminants at concentrations that could adversely impact beneficial uses or exceed any water quality objective or standard. Water quality characteristics of concern would be settleable material, suspended material, turbidity, and color. During any discharge, BMPs, such as a filtration device or settling tank, would be implemented to remove settleable material from the effluent. In addition, the turbidity and color of the receiving water would be monitored. The BMPs would be described in the project's Storm Water Pollution Prevention Plan (SWPPP).

TEMPORARY AND PERMANENT DRAINAGE

The East Span Project includes modification and enhancement of existing drainage facilities including the outfalls at the Oakland Touchdown and at YBI. Currently, the westbound roadway at the Oakland Touchdown is drained by sheet flow that is filtered by a vegetated strip. Some portions of the eastbound roadway drain to an existing drainage system, which leads to an open channel that drains south to the Bay. The existing drainage channel is part of the City of Oakland drainage system. The remaining eastbound roadway portions drain north to the Bay via four existing outfalls.

Oakland Touchdown Drainage

Three existing outfalls that drain to the north of the existing bridge would be modified to accommodate the new fill and new roadway features. All three outfalls would be extended. In addition, four new 1.5-feet-diameter (0.46-meter-diameter) outfalls would be required to drain the roadway surface runoff to the Bay. The outfalls would drain to the north shore of the Oakland Touchdown. Runoff from the relocated maintenance road would drain south to the Bay through the open channel. During construction of the East Span Project, four additional 1.5-feet-diameter (0.46-meter-diameter) outfalls, which would drain temporarily to the northern shore of the Oakland Touchdown, would be required to accommodate the runoff from the surcharge material placed adjacent to the geotube. The drains would be removed when the surcharge is removed.

YBI Drainage

Within the project area, drainage at YBI would use existing outfalls and drainage features as well as new ones. Currently the system collects the bridge and surface runoff from YBI and conveys it to the Bay via a number of existing outfalls. The new drainage system would separate the Caltrans runoff from the rest of the YBI drainage and carry it through a number of new drainage systems to the Bay. The new drainage system would discharge into the Bay via four outfalls; two outfalls would be in new locations, one outfall would utilize an existing outfall location, and one of the outfalls would be an unmodified existing outfall where a new system would connect.

- The first new outfall would be located on the northeast side of YBI just north of Pier W2 of the westbound structure. It would carry some of the runoff from the new bridge deck and the surface runoff of the portion of Caltrans right-of-way located north of the new structure.

- The second new outfall would be located east of the U.S. Coast Guard (USCG) facility, south of the new bridge, on a small beach area. At this location two new pipes would be placed adjacent to the existing pipe, one for local drainage and one for Caltrans drainage.

- The modified outfall would be located at the USCG facility between Building 27 and the tennis court. A new outfall pipe would be placed at this location, adjacent to the existing outfall pipe to carry Caltrans drainage. A portion of new local roadway runoff would be tied to the existing outfall pipe.

- At the unmodified outfall location, part of the new YBI drainage system would tie into a portion of the existing system which would carry water to the Bay via an existing outfall pipe located north of Building 22 on the USCG facility. Although the existing pipe would not be replaced with a different diameter, the amount of flow could change, mostly likely reduced.

PROPOSAL FOR STORM WATER TREATMENT BEST MANAGEMENT PRACTICES (BMPS) IN THE VICINITY OF THE BAY BRIDGE TOLL PLAZA

Caltrans proposes modifications to the storm water drainage system in the vicinity of the Bay Bridge Toll Plaza to allow treatment using BMPs. The proposed rainfall catchment area is 155 acres (63 hectares) including the areas of the existing toll plaza, existing Caltrans freeway structures, and a portion of the new East Span. The existing drainage system includes hydraulic retention basins designed to control roadway flooding but does not include features to treat storm water runoff. Proposed BMPs include both Caltrans-approved BMPs as well as BMPs that are not currently approved. Installation and monitoring of unapproved BMPs would be done as part of the Caltrans pilot BMP testing program in partnership with the Regional Water Quality Control Board. Proposed BMPs are designed to treat the water quality storm volume in accordance with design guidance developed by Caltrans.

Six catchment groups have been identified. Drainage system piping improvements would be necessary in each catchment group to convey storm water to the proposed BMPs. Drainage system improvements include installation of two new pump stations as well as piping and other conveyance features. Storm water BMPs were selected for each catchment group based on the land availability, planned land use, and other site constraints.

ENVIRONMENTAL SETTING

The proposed East Span Project is located within the central portion of the San Francisco Bay. The central portion of the Bay is characterized by riprap sloped shoreline adjacent to roadways, commercial development and industrial areas. Undeveloped shoreline within the Central Bay is typically dominated by ruderal upland vegetation and rarely includes a wetland-upland transition zone. However, there are portions of the Central Bay which support stands of native coastal habitats including the Emeryville Crescent and the Hoffman Marsh in Richmond.

The conditions at the project site are consistent with the Central Bay in terms of the absence of wetland-upland transition zones and the predominance of riprap shoreline.

The YBI portion of the project site supports the following habitat types (locations are shown in Figure 5 in Section 4):

- Small stands of coast live oak woodland habitat occur south of the bridge, including trees and shrubs such as toyon, blue elderberry, California hazelnut, and California buckeye;
- Northern coastal scrub habitat on the steep bluffs of YBI and includes California sagebrush, yarrow, and seaside woolly sunflower;
- A narrow band of northern coastal salt marsh occurs along the northern side of YBI, but this habitat type is sparsely vegetated; and

- Eelgrass beds occur on the northern side of YBI near Clipper Cove and on the eastern side of YBI near the USCG Facility.

The Oakland Touchdown area includes a riprap shoreline along its perimeter and small portions of the following habitat types (locations are shown in Figure 6 in Section 4):

- Eelgrass beds in the intertidal areas just north of the bridge approach;
- Two small seasonal non-tidal wetlands along the south side of the bridge approach;
- Tidal wetlands near Radio Beach on the north side of the bridge approach;
- Northern foredunes adjacent to and north of Radio Beach on the north side of the bridge approach;
- Sand flats adjacent to the bridge approach and toll plaza; and ruderal upland vegetation within uplands throughout the Oakland Touchdown area; and
- Ruderal upland vegetation within uplands throughout the Oakland Touchdown area.

ENVIRONMENTAL IMPACTS

Appendix F provides a summary of the environmental impacts as described in the Final Environmental Impact Statement (FEIS). The project described in this application for RWQCB certification is referenced in the FEIS as Replacement Alternative N-6 (Preferred Alternative). The U.S. Environmental Protection Agency (EPA) and ACOE reviewed the Section 404(b)(1) analysis and concurred that the Replacement Alternative N-6 is the least environmentally damaging practicable alternative (LEDPA). See Appendix A for the EPA and ACOE concurrence letters.

BLOCK 15

PROJECT PURPOSE AND NEED

The San Francisco – Oakland Bay Bridge is an important transportation component of the Bay Area, providing regional access between the San Francisco Peninsula and the East Bay. On average, 272,000 vehicles currently use the bridge each day. As part of Interstate 80, it is a critical link in the interstate highway network. The existing East Span is not expected to withstand a maximum credible earthquake (MCE)[1] on the San Andreas or Hayward fault, which is the largest earthquake reasonably capable of occurring based on current geological knowledge. The existing bridge does not meet lifeline criteria for providing emergency relief access following an MCE. Also, it does not meet current operations and safety design standards. The project's Purpose and Need is to provide a seismically safe vehicular lifeline[2] connection. The project is one of several that Caltrans has completed or is currently undertaking to address the overall need for a bridge connection between the cities of San Francisco and Oakland that meets lifeline criteria.

The Purpose and Need of the project is to provide a vehicular lifeline connection that:

- Connects YBI in San Francisco and the Bay Bridge Toll Plaza in Oakland;
- Connects to a lifeline route linking the East Bay, San Francisco, and the San Francisco Peninsula;
- Maintains the current vehicular capacity of the existing East Span;
- Provides for the safety of East Span users during an MCE on the San Andreas or Hayward fault; and
- Improves operational and safety design to meet current standards to the greatest extent possible.

[1] An MCE is the largest earthquake reasonably capable of occurring, based no current geological knowledge. Caltrans has projected the MCE for the East Span as an earthquake of magnitude 8 (Richter scale) on the San Andreas Fault or magnitude 7-1/4 on the Hayward fault. However, while earthquakes are often described in terms of the magnitude, they can also be described in terms of their return period, which is the approximate time interval expected between two earthquakes of comparable intensity. Designers of major engineering structures design for an earthquake with a long return period of approximately 1,000 to 2,000 years, called a Safety Evaluation Event (SEE). Designers for the East Span Project are using a SEE with a 1,500-year return period in their design criteria for a replacement bridge. This SEE is an earthquake that would generate the largest rock motions expected to occur at the bridge site an average of once every 1,500 years, or ten times the projected 150-year life span of the replacement bridge. The Seismic Safety Peer Review Panel and the ground motion subcommittee of MTC's Engineering and Design Advisory Panel (EDAP) considered it appropriate to design the bridge for these ground motions.

[2] Lifelines are the systems and facilities that provide services vital to the function of an industrialized society and are critical to the emergency response and recovery after a natural disaster. These systems and facilities include hospitals, fire control and policing, food distribution, communication, electric power, liquid fuel, natural gas, transportation (airports, highways, ports, rail, and transit), water, and wastewater.

Additional criteria applied to the development of the East Span Project include the following:

- Meets Caltrans criteria for designation as a vehicular lifeline connection;
- During and after construction, maintains the existing number of traffic lanes during peak hours;
- Does not preclude a bicycle/pedestrian path;
- Does not preclude future improvements to YBI access ramps;
- Minimizes impacts to environmental resources;
- Provides a high level of visual quality; and
- Is a cost-effective solution.

BLOCK 16

REASONS FOR DISCHARGE

Temporary discharge of fill may include the following:

- A barge dock at Clipper Cove along the northern shore of YBI. The dock would be used for the movement and loading of materials, equipment and work crews;
- Two trestles in waters near the Oakland Touchdown for construction access;
- A trestle at YBI for construction access;
- Cofferdams to install piles and pile caps;
- A geotube to serve as a tidal berm to protect the westbound roadway construction area at the Oakland Touchdown from wave action and tidal inundation;
- Falsework to support new construction; and
- Falsework piers in deep waters near YBI to support the main span and to support the skyway and Oakland approach structures during construction.

Permanent discharge of fill would include:

- New piers and pile caps to support the new bridge structure;
- Engineered fill and rock slope protection to create the new westbound roadway at the east approach to the bridge;
- Engineered fill and rock slope protection for the relocated maintenance road at the Oakland Touchdown; and
- Fenders to protect the piers and pile caps.

Additional discharges would result from dredging activities as described below.

Dredging would be required for barge access in intertidal areas at the Oakland Touchdown area (see Figures 5 and 6 in Section 4). A barge access channel would be created along the northern side of the existing bridge in the vicinity of the Oakland Touchdown area. The channel would make it possible for construction activities to be staged from barges. A second access channel would be created to allow barge access during the dismantling of the existing bridge, also at the Oakland Touchdown area (see summary of dredging quantities below). Additional dredging would be required during the installation of the piles and pilecaps.

Dredging techniques may include hydraulic methods utilizing cutterheads, dustpans, hoppers, hydraulic pipelines, and plain suction equipment. Hydraulic dredging typically minimizes disturbance and resuspension of sediments, but involves the entrainment of high volumes of water. In addition, mechanical dredging techniques may be utilized including clamshell (open

and closed bucket), dipper, or ladder dredging methods. Sediments are dislodged and excavated and then raised to the surface and discharged into a barge or scow.
The Dredged Material Management Office (DMMO) has reviewed the proposed dredged material disposal plan for the project and concurs with the plan. See the Caltrans letters dated June 19, 2001 and August 15, 2001 and the DMMO letters dated July 06, 2001 and August 17, 2001 in Appendix H. A summary of the materials to be dredged and the proposed reuse/disposal methods is presented in the table below.

	SUMMARY OF DREDGING QUANTITIES				
Activity	**Dredging to Create Barge Access Channel to Construct New Bridge**	**Dredging to Construct New Piers and Footings**	**Dredging to Create Barge Access Channel to Dismantle Existing Bridge**	**Dredging to Remove Existing Bridge Piers**	**Total Dredged Volume**
Proposed Reuse/Disposal Site(s) for SUAD Material	**SF-DODS**	**SF-11**	**Upland wetland reuse, SF-DODS, and/or landfill reuse**	**SF-11**	
Volume	**216,230 (yards^3)** **165,320 (m^3)**	**187,087 (yards^3)** **143,038 (m^3)**	**190,680 (yards^3)** **145,785 (m^3)**	**22,724 (yards^3)** **17,374 (m^3)**	**616,721 (yards^3)** **471,517 (m^3)**

BLOCK 18

AMOUNT OF MATERIAL BEING DISCHARGED

IMPACTS TO OTHER WATERS OF THE U.S.

Net Change in Volume of Other Waters of the U.S.

The East Span Project would result in new fill in Other Waters of the U.S. as defined by the U.S. Army Corps of Engineers (ACOE). However, the removal of dredged sediments and the removal of the existing bridge would offset the volume of the new fill. The volume of Other Waters of the U.S. would increase as a result of the following construction activities:

- Removing dredged sediments to create a barge access channel for construction of the replacement bridge;
- Removing dredged sediments to construct piers for the new bridge;
- Removing dredged sediments to create a barge access channel to dismantle the existing structure;
- Removing dredged sediments to dismantle the existing bridge piles below the mud line; and
- Removing the existing bridge piers and fenders.

Because the East Span Project would increase the volume of Other Waters of the U.S., it would have a beneficial impact on Other Waters of the U.S. The table below summarizes the approximate net change in volume of Other Waters of the U.S. that would occur as a result of the East Span Project.

East Span Project	
Activity	**Volume of Material**[b]
New Fill from Construction (Reduction in Volume)	65,979 cubic yards (50,447 cubic meters)
Net Removal of Sediment (Increase in Volume)[a]	364,910 cubic yards (278,994 cubic meters)
Removal of Existing Bridge Piers and Fenders (Increase in Volume)	85,600 cubic yards (65,450 cubic meters)
Net Change in Volume of Other Waters of the U.S.	Increase of: 384,531 cubic yards (293,997 cubic meters)

[a] Removal of sediments for barge access and to prepare for pile installation increases the volume of Other Waters of the U.S. These net calculations take into account that portion of the barge access channel that would be restored for eelgrass habitat. Up to 42,000 cubic yards (32,100 cubic meters) of dredged material may be used to restore a portion of the barge access channel to pre-existing bathymetry. The net removal of sediment takes into account that portion of sediment that would be disposed of at Alcatraz (SF-11). Approximately 209,811 cubic yards (160,412 cubic meters) of sediment would be disposed of at SF-11.

[b] Quantities in this table are based on National Geodetic Vertical Datum (NGVD) 1929 and were calculated to the High Tide Line (HTL).

Net Change in Surface Area of Other Waters of the U.S.

The East Span Project would decrease the surface area of Other Waters of the U.S. as compared to its current surface area. Although the project would remove sediments for barge access and to prepare for pile installation and would remove the existing bridge, the fill removal would not offset the surface area of the new fill in Other Waters of the U.S. Since the sediments are submerged, their removal does not contribute to an increase in the surface area of Other Waters of the U.S.

Because the East Span Project would decrease the surface area of Other Waters of the U.S., there would be a negative impact on Other Waters of the U.S. The table below summarizes the approximate net change in surface area of Other Waters of the U.S. that would occur as a result of the East Span Project.

East Span Project	
Activity	**Surface Area[b]**
New Fill from Construction (reduction in surface area)	2.43 acres (0.97 hectares)
Removal of Existing Sediment[a]	N/A
Removal of Existing Bridge Piers and Fenders (increase in surface area)	1.98 acres (0.80 hectare)
Net Change in Surface Area of Other Waters of the U.S.	Decrease of 0.45 acre (0.17 hectare)

[a] Removal of submerged sediments to create barge access, prepare for pile installation, and to remove the existing bridge does not increase the surface area of Other Waters of the U.S.

[b] Quantities in this table are based on National Geodetic Vertical Datum (NGVD) 1929 and were calculated to the High Tide Line (HTL).

Temporary Change in Volume of Other Waters of the U.S.

The East Span Project would require the placement of temporary fill for in-Bay construction that would temporarily decrease the volume of Other Waters of the U.S. Temporary fill may include:

- A barge dock at YBI to facilitate transport of construction materials, equipment, and personnel;
- Two trestles in waters at the Oakland Touchdown for construction access;
- A trestle at YBI for construction access;
- Cofferdams to install piles and pile caps;
- A geotube to serve as a tidal berm during construction to protect the westbound roadway at the Oakland Touchdown from wave action and tidal inundation;

- Falsework to support new construction; and
- Falsework piers in deep water areas to erect and support the main suspension span.

Although all fill for temporary structures would be removed at project completion, construction activities would temporarily decrease the volume and surface area of Other Waters of the U.S. Some temporary fill, such as the cofferdams, geotube, falsework, and temporary support structures for the main span would be removed following completion of a particular segment of work. Other temporary fill, such as barge docks and access trestles would be in place for the duration of the new bridge construction and the dismantling of the existing bridge, which is expected to be a total of approximately seven years.

As a result, the East Span Project would have a negative impact. The volume of Other Waters of the U.S. as a result of the East Span Project would temporarily decrease by approximately 54,000 cubic yards (41,000 cubic meters).

Temporary Change in Surface Area of Other Waters of the U.S.

The East Span Project would require the placement of fill for in-Bay construction that would temporarily decrease the surface area of Other Waters of the U.S. Temporary fill may include:

- A barge dock at YBI to facilitate transport of construction materials, equipment, and personnel;
- Two trestles in waters at the Oakland Touchdown for construction access;
- A trestle at YBI for construction access;
- Cofferdams to install piles and pile caps;
- A geotube to serve as a tidal berm during construction to protect the westbound roadway at the Oakland Touchdown from wave action and tidal inundation;
- Falsework to support new construction; and
- Falsework piers in deep water areas to erect and support the main suspension span.

Although all fill for temporary structures would be removed at project completion, construction activities would temporarily decrease the volume and surface area of Other Waters of the U.S. Some temporary fill, such as the cofferdams, geotube, falsework, and temporary support structures for the main span would be removed following completion of a particular segment of work. Other temporary fill, such as barge docks and access trestles would be in place for the duration of construction and dismantling.

As a result, the East Span Project would have a negative impact. The surface area of Other Waters of the U.S. as a result of the East Span Project would temporarily decrease by approximately 1.84 acres (0.73 hectare).

BLOCK 19

SURFACE AREA IN ACRES OF WETLANDS OR OTHER WATERS TO BE FILLED

The tables below provide a summary of the impacts to special aquatic sites based on the October 2000 eelgrass survey[1] and the U.S. Army Corps of Engineers jurisdictional delineation. As summarized in the tables below, the East Span Project would not result in permanent or temporary impacts to either tidal or non-tidal wetlands. However, approximately 3.24 acres (1.31 hectares) of eelgrass beds and approximately 4.19 acres (1.70 hectares) of sand flats would be permanently displaced and approximately 0.36 acre (0.14 hectare) of eelgrass beds and 0.80 acres (0.32 hectare) of sand flats would be temporarily displaced (see Figures 7 and 8 in Section 4).

Permanent Impacts to Special Aquatic Sites				
	Eelgrass	Sand Flats	Tidal Wetlands	Non-Tidal Wetlands
Total Impact	3.24 acres (1.31 hectares)	4.19 acres (1.70 hectares)	No Impact	No Impact

Temporary Impacts to Special Aquatic Sites				
	Eelgrass	Sand Flats	Tidal Wetlands	Non-Tidal Wetlands
Total Impact	0.36 acre (0.14 hectare)	0.80 acres (0.32 hectare)	No Impact	No Impact

Project Impacts to Eelgrass Beds

Permanent impacts to eelgrass beds would result from dredging the barge access channel at the Oakland Touchdown and constructing a barge dock on the north side of YBI near Clipper Cove (see Figures 7 and 8 in Section 4).

Barge access is necessary to construct the piles, pile caps and bridge deck; however, the water at the easternmost portion of the project area at the Oakland Touchdown is too shallow to allow access for construction barges. An access channel must be dredged (see Figure 8 in Section 4). A temporary dock may be constructed at Clipper Cove to transport construction equipment, supplies and workers to and from the YBI project area. Although the dock is temporary, it would displace a limited area of eelgrass within Clipper Cove when it is constructed. Caltrans has used a conservative approach that assumes construction activities associated with the barge dock would result in permanent impacts, although it is likely that eelgrass beds will re-establish within the footprint of the barge dock once it is removed.

[1] Caltrans completed a pre-construction survey in October 2000 to provide data immediately prior to construction to measure actual impacts to the greatest extent possible. This survey has a limited purpose as opposed to prior surveys. Prior surveys conducted in 1999 were used in preparing the U.S. Army Corps of Engineers Section 404(b)(1) alternatives analysis.

Temporary impacts to eelgrass near the Oakland Touchdown may result from increased turbidity as a result of dredging. Increased turbidity from this activity would be localized. Other activities that could contribute to increased turbidity are propeller wash from tug boats moving barges; mud boils resulting from the geotube and the placement of engineered fill; and pile driving for both temporary trestles and the permanent bridge structure.

At YBI, the activities that could contribute to increased turbidity are propeller wash from tug boats moving barges; and pile driving.

Caltrans would implement a turbidity control program. The program would include measuring turbidity and light attenuation at the project boundary to compare with ambient conditions within the eelgrass beds. These measurements would be used to monitor additional sediment transport caused by dredging and other construction activities within the project boundaries. If necessary, turbidity control measures would be implemented.

Project Impacts to Sand Flats

Permanent impacts to sand flats would result from:

- Dredging the barge access channel at the Oakland Touchdown (see Figures 5 and 6 in Section 4);
- The placement of engineered fill for the westbound approach roadway at the Oakland Touchdown;
- The maintenance road at the Oakland Touchdown; and
- Shading from the bridge decks (roadway structures) at the Oakland Touchdown.

Identifying dredging for the barge access channel as a permanent rather than a temporary impact is a conservative approach based on the uncertainty about the time frame in which the channel would return to its original bathymetry through natural sedimentation. Engineered fill for the westbound approach roadway and the maintenance road would be placed along the northwest side of the Oakland Touchdown. This fill would permanently impact sand flats.

Temporary impacts to sand flats would result from use of a geotube near the Oakland Touchdown. A geotube would be placed north of the Oakland Touchdown area along the outside border of the work area as a tidal berm to facilitate installation of wick drains, and placement of engineered fill and surcharge for construction of the bridge approach. A geotube is a large, high-density polyethylene tube filled with excavated material and is used as a temporary tidal barrier during construction (see Figure 4 in Section 4).

Timing of Impacts

The Skyway Contract would be the first order of work and is targeted to commence in early 2002. No impacts to special aquatic sites would occur with construction of the skyway. The Oakland Geofill Contract would affect special aquatic sites and sand flats. The first order of work under this contract is the placement of the geotube. Barge docks at YBI would be constructed in early 2003 under the SAS/YBI Contract. The westernmost barge dock at YBI would impact eelgrass beds. Dredging the barge access channel for the Oakland Touchdown Structures Contract would occur in the Fall of 2003. This would impact eelgrass beds and

sand flats. Construction under the Oakland Touchdown Structures Contract would occur in late 2003. This would impact sand flats due to shading created by the roadway structures.

Avoidance and Minimization of Impacts to Special Aquatic Sites

Design considerations to avoid and minimize impacts to special aquatic sites include:

- The westbound roadway at the Oakland Touchdown was initially designed on a straight alignment west of the Bay Bridge Toll Plaza. When Caltrans determined that this alignment would bisect and significantly impact large portions of Radio Beach and intertidal habitat areas, the roadway was realigned to the south. The proposed traffic lanes now curve slightly southward, significantly reducing the impacts to Radio Beach, eelgrass beds, and sand flats.
- In the Dredged Material Management Plan, dated June 1999, the proposed width of the barge access channel was 270 feet (82 meters). Since then, Caltrans has reduced the width of the barge access channel to 165 feet (50 meters) to further minimize impacts to special aquatic sites. Near the Oakland Touchdown, Caltrans has tapered the width of the channel to 150 feet (45 meters) and reduced the depth of the access channel from –14 feet (–4.3 meters) mean sea level to –12 feet (–3.7 meters) mean sea level. This reduces the area of special aquatic sites that would be affected by dredging.

Caltrans would also implement special measures to minimize potential impacts during construction and protect special aquatic sites including:

- Marking environmentally sensitive areas in the field with fencing, buoys or similar devices to limit construction activities to pre-determined areas;
- Placing geotextile fabric onto the sand flats before placing the geotube to minimize mud boils;
- Using a geotube as a tidal berm rather than engineered fill. The geotube utilizes sand contained within a geotextile fabric, thereby minimizing turbidity;
- Using temporary trestles, rather than placing solid fill in the Bay, for temporary construction access; and
- Implementing a turbidity control program to contain and control turbidity impacts to eelgrass beds. If necessary, additional turbidity control measures would be implemented.

BLOCK 20

MITIGATION
(Describe the size, type and functions and values)

LOCATION OF MITIGATION/SITE FEASIBILITY

Caltrans conducted an extensive review of potential mitigation sites in the central San Francisco Bay over the course of 1 ½ years to identify areas suitable for creating and/or restoring eelgrass beds, sand flats, mudflats and tidal marsh. Most of the sites were not feasible because they were either too small or were not available for mitigation purposes. Only one site within the Central Bay, the Breuner property, was large enough to meet the mitigation requirements of the project. However, several significant constraints precluded Caltrans from utilizing the site. As a result, Caltrans now proposes on-site restoration of sand flats and eelgrass beds and providing $8,000,000 to the USFWS to acquire and restore Skaggs Island in southern Sonoma County. Although Skaggs Island is not within the Central Bay, it would result in significant benefits to the San Francisco Bay ecosystem by supporting restoration of approximately 3,000 acres (1,214 hectares) of diked historic baylands to aquatic habitat. Below is a summary of the potential mitigation sites evaluated by Caltrans.

Potential mitigation sites immediately adjacent to the project area and the Emeryville Crescent were rejected because the sites were too small or not available for the required mitigation. These sites included:

- **Radio Point.** The Radio Point site is located immediately north of the Bay Bridge Toll Plaza, less than 525 feet (160 meters) from the project area in the City of Oakland. The Port currently owns the land and has reserved it for its own future mitigation needs.
- **West Grand Avenue.** The West Grand Avenue site is located north of the new West Grand Avenue overpass at Interstate 80, just east of the Bay Bridge Toll Plaza in the City of Oakland. This site is partially owned by the Port of Oakland and the State of California. The East Bay Regional Park District (EBRPD) manages the state-owned portion of this site as part of the Eastshore State Park. Caltrans previously used the state-owned portion of the site as mitigation for the I-80 HOVL and I-880 Cypress projects. The Port may retain its portion of the site for future mitigation needs.
- **Oakland Touchdown.** The Oakland Touchdown site is within the existing Caltrans right-of-way where the existing Bay Bridge touches land in Oakland. It would revert to the Port of Oakland if Caltrans declares it excess to transportation needs. EBRPD has expressed interest in this land becoming part of the proposed Gateway Park. Caltrans may also use a portion of this site for its off-bridge collection and treatment of stormwater runoff.

Several potential sites north of the project area within the Eastshore State Park are managed by the EBRPD. EBRPD is developing a long-range plan for the Park to identify potential recreational uses and improvements. This may include habitat creation and enhancement. However, the planning process, which will include extensive public participation, may not be completed until 2002. EBRPD's timeline is not in accord with the plans for the East Span Project; therefore these sites were eliminated from consideration as potential mitigation sites. These sites included:

- **Brickyard Cove.** The Brickyard Cove site is located just south of University Avenue on the west side of Interstate 80 in the City of Berkeley. The EBRPD manages Brickyard Cove as part of the Eastshore State Park and the State of California owns the property.
- **Berkeley Meadows/Virginia Street.** The Virginia Street site is located north of University Avenue on the west side of Interstate 80 in the City of Berkeley. The EBRPD manages the Virginia Street site as part of the Eastshore State Park complex and the State of California owns the property.

Potential mitigation sites at and near the City of Albany's former landfill were also evaluated. However, these sites are too small to meet Caltrans' mitigation needs. Moreover, the City of Albany has received funds from the State of California to restore Albany Bulb and Albany Beach, precluding the use of these sites by Caltrans for mitigation purposes. These sites included:

- **Buchanan Marsh.** The Buchanan Marsh site is located south of Buchanan Street and west of Interstate 80 in the City of Albany. Magna Entertainment, owner of the adjacent Golden Gate Fields Racetrack, owns this property.
- **Albany Bulb and Beach.** The Albany Bulb and Beach are located northwest of Golden Gate Fields racetrack, west of Interstate 80, near the terminus of Buchanan Street. The City of Albany owns these parcels and has funds for their restoration.

Two potential mitigation sites were identified in the City of Richmond including the Liquid Gold property and the Breuner property. The Liquid Gold/Hoffman site is too small to meet Caltrans' mitigation needs. The Breuner site is sufficiently large and was initially identified by Caltrans as a preferred mitigation site. Caltrans developed conceptual mitigation scenarios for the site. However, several significant constraints precluded Caltrans from utilizing the site for mitigation.

- **Liquid Gold/Hoffman Marsh.** The Liquid Gold/Hoffman Marsh site is located just north of Point Isabel Regional Park in the City of Richmond. Southern Pacific and the EBRPD own these properties.
- **Breuner.** The Breuner site is located west of Interstate 80 and north of the Richmond Parkway in the City of Richmond. Bay Area Wetlands (BAW) owns this property and plans to develop it as a wetlands mitigation bank.

In preparing the site feasibility analysis in the Conceptual Mitigation Plan for Special Aquatic Sites, dated November 2000, Caltrans consulted with state and federal resource agencies including: the San Francisco Bay Conservation and Development Commission (BCDC); the

Regional Water Quality Control Board (RWQCB); the California Department of Fish and Game (CDFG); U.S. Army Corps of Engineers (ACOE); U.S. Environmental Protection Agency (USEPA); and USFWS. Caltrans presented and refined its site selection and mitigation proposal in response to agency concerns expressed at several ACOE Interagency meetings. Recognizing the inherent uncertainty in creating new eelgrass habitat and sand flats within San Francisco Bay, and the difficulty in finding suitable mitigation sites in the central Bay, the Interagency Group reached consensus that off-site and out-of-kind mitigation at the Breuner site was acceptable. Pursuant to the NEPA/404 process, the USFWS, USEPA and the ACOE gave preliminary agreement that the Conceptual Mitigation Plan for Special Aquatic Sites was adequate.

At the Breuner property, off-site mitigation would have involved creating and enhancing approximately 64.35 acres (26.05 hectares) of a tidal marsh ecosystem including:

- 1.01 acres (0.41 hectares) of new mudflats;
- 2.05 acres (0.83 hectares) of new tidal marsh channels;
- 22.86 acres (9.25 hectares) of new tidal marsh;
- 5.94 acres (2.41 hectares) of enhanced uplands;
- 24.39 acres (9.87 hectares) of enhanced jurisdictional wetlands; and
- 8.10 acres (3.28 hectares) of existing intertidal areas.

This approach provided a replacement of aquatic habitat at a 3 to 1 ratio. The estimated cost for implementing mitigation at the Breuner property was approximately $8,000,000 based on initial per-acre costs provided by BAW.

Below is a summary of the issues that would have significantly delayed implementing mitigation at the Breuner site and obtaining state and federal permits for the East Span Project:

- **Hazardous Materials Testing.** Caltrans requires access to the mitigation site to determine whether hazardous materials are present and the extent of their presence prior to entering into any agreement for mitigation services. BAW would not grant Caltrans access to the site and would not do so unless Caltrans enters into an agreement to acquire BAW's services;
- **Section 7 Endangered Species Consultation.** Under the Endangered Species Act, the ACOE must ensure that the project does not adversely affect an endangered or threatened species or their habitat. Accordingly, the ACOE would require that Caltrans initiate Section 7 Endangered Species Consultation with the USFWS. Given its proximity to Giant Marsh at Point Pinole, the Breuner property is likely to support the endangered Salt Marsh Harvest Mouse (SMHM). To ascertain the presence and distribution of the SMHM and other endangered and threatened wildlife and plant species, Caltrans must survey the site. However, BAW would not grant Caltrans access to the site to conduct such surveys;
- **Sole Source Contracts.** BAW has acquired the Breuner property with the intention of creating a wetland mitigation bank. It proposes to design, construct, and monitor the mitigation site consistent with the requirements of state and

federal resource agencies and sell a turn-key product to interested parties on a per-acre basis. In essence, BAW is providing a service. A contract with BAW would be a sole source contract. Sole source contracts under State law are extremely difficult and time-consuming to justify. Caltrans has explored other arrangements to avoid a sole source contract but has not found any;

- **Acquisition of Property Interest.** BAW will only sell its service, not its land to Caltrans. Absent a willing seller, Caltrans must invoke the State's powers of eminent domain to acquire the property. The California Transportation Commission must approve any condemnation action. The process to approve a condemnation can be very time-consuming and may not be successful; and
- **Public Access.** The Bay Trail Project identifies a future Bay Trail segment along the eastern perimeter of the Breuner property and a spur trail along the shoreline to a spit of land that juts into the Bay. The Bay Trail Project, BCDC, the EBRPD and local trail groups all support implementation of the Bay Trail at the Breuner Property. However, the USFWS and USEPA have expressed some concern over siting the spur trail through potential endangered species habitat. Caltrans has concluded that disagreements among the various regulatory and resource agencies, as well as citizens' groups, on siting and designing the public access could result in additional delays to obtaining the necessary permits to construct the bridge.

Proposed Mitigation

To offset the placement of permanent and temporary fill in San Francisco Bay and impacts to eelgrass beds and sand flats, Caltrans proposes on-site restoration of eelgrass beds and sand flats. In addition, Caltrans proposes to provide $8,000,000 to the USFWS to acquire and restore approximately 3,000 acres (1,214 hectares) of diked historic baylands at Skaggs Island in southern Sonoma County consistent with the Baylands Ecosystem Habitat Goals (see Appendix D - Conceptual Mitigation Plan for Special Aquatic Sites). Below is a discussion of on-site mitigation followed by off-site mitigation.

On-site Mitigation

Caltrans evaluated options for in-kind replacement of permanently impacted sand flats at or near the project site. Although in-kind mitigation is preferable, Caltrans has concluded that this is not feasible on the scale required for the East Span Project due to the difficulty of finding sufficient and suitable land at or near the project site. However, Caltrans proposes on-site restoration of a portion of the sand flats that would be temporarily impacted by construction activities.

Creation of new sand flat habitat is constrained by several factors. First, sand flats are a transitional intertidal habitat. Water permanently borders the lower edge of the sand flat while the upper edge of the sand flat transitions to tidal marsh or directly to uplands. There are two options for creating new sand flats: (1) extend the sand flat at the lower edge; or (2) extend the sand flat at the upper edge. Extending the sand flat at the lower edge is feasible, but not desirable, because it requires filling open water to create appropriate intertidal elevations. Extending the sand flat at the upper margin is desirable only if the sand flat is bordered directly by uplands. Otherwise it is necessary to excavate wetlands or other jurisdictional habitat.

If the sand flat is bordered directly by uplands, the sand flat can be extended on the landward side by excavating the uplands. The uplands would need to be excavated to a sufficient depth to prevent colonization by tidal marsh plant species. However, the upper edge of an existing sand flat is generally slightly lower than the lower limit of tidal marsh species. This leaves very little space with which to construct the new sand flats. It is likely that the created sand flats would quickly fill with sediment and become colonized by tidal marsh species. One possible solution, creating long strips of narrow sand flats, is not feasible because there are no sites in the project vicinity with a sufficient amount of shoreline available.

Caltrans also evaluated options for in-kind replacement of permanently impacted eelgrass beds at or near the project site. Initially, Caltrans proposed to create new eelgrass beds at the Oakland Touchdown area and at Clipper Cove on YBI by placing sand-filled plateaus to raise the elevations of the Bay bottom to a level suitable to support eelgrass growth and then planting the areas with eelgrass from a donor site. However, the staff of several resource and regulatory agencies, including BCDC, opposed creating new habitat in the Bay using fill material.

Creation of eelgrass habitat is still experimental in the Bay, and the success rate for such projects varies depending on what method is used[3]. The Richmond Harbor Training Jetty Eelgrass Transplant Program, which was completed in 1985, was among the first transplant programs in the Bay Area. Eelgrass was transplanted to a site that was not manipulated. The survival of the plants was mixed, depending on the location and age of the donor material. The eelgrass in the control and transplant areas did not expand their range in the spring and summer of the transplant year. Based on the experience of this project, Merkel concluded that in the Bay sites specifically manipulated for eelgrass transplantation may be more successful[3, 4]. Although much research on eelgrass restoration has occurred in southern California, the habitat in the San Francisco Bay is sufficiently different that available data from southern California is not readily transferable.

Despite these challenges, Caltrans proposes on-site restoration of eelgrass habitat. This approach is distinct from creating new eelgrass habitat in that it focuses on restoring areas that are historically known to have supported eelgrass habitat. The proposed restoration would maximize the potential for planting success by incorporating site manipulation, monitoring and data collection.

Proposed on-site mitigation includes:

- Harvesting approximately 0.55 acres (0.22 hectares) of eelgrass from the footprint of the barge access channel prior to dredging, planting test plots in adjacent eelgrass beds and monitoring to evaluate performance;
- Restoring to its pre-construction bathymetry up to approximately 1.73 acres (0.70 hectares) of the barge access channel. Dredged material and excavated sand would be used to facilitate eelgrass colonization and the area would be replanted with eelgrass from an adjacent donor site;

[3] Merkel & Associates, Inc., Analysis of Eelgrass and Shallow Water Habitat Restoration Programs Along the North American Pacific Coast: Lessons Learned and Applicability to Oakland Middle Harbor Enhancement Area Design, Report to the Port of Oakland, CA, August 10, 1998.
[4] Fredette, T.J., M.S. Fonseca, W.J. Kenworthy and S. Wyllie-Echeverria, An Investigation of Eelgrass (*Zostera marina*) Transplant Feasibility in San Francisco Bay, CA, COE Report EL-88-2, Army Engineer Waterways Experiment Station, Vicksburg, MS, 1988.

- Restoring approximately 1.70 acres (0.69 hectares) of sand flats that are temporarily affected by the placement of a geotube or mud boils from engineered fill;
- Constructing rock slope protection to allow sand to accrete over the rock areas subject to tidal action. Slope gradients would be 1(V):3(H) at the toe of the slope and transition to a 1(V):2(H) gradient at mid-slope; and
- Capping rock slope protection areas with soil above the limits of tidal action to provide a medium to support growth of native upland plants and provide more natural upland transition than the existing abrupt slope.

Off-site Mitigation

In addition to on-site mitigation, Caltrans proposes to provide $8,000,000 to USFWS to acquire and restore approximately 3,000 acres (1,214 hectares) of habitat at Skaggs Island consistent with the Baylands Ecosystem Habitat Goals. Prior to construction of any portion of the East Span Project, Caltrans would deposit the funds in an interest-bearing trust account for use by USFWS. All principal and accrued interest would be available for acquisition and restoration of aquatic habitat. Caltrans would continue consultation with state and federal resource and regulatory agencies on the parameters of the acquisition and restoration fund and mitigation opportunities at Skaggs Island. The relevant agencies would include:

- San Francisco Bay Conservation and Development Commission;
- Regional Water Quality Control Board;
- California Department of Fish and Game;
- US Army Corps of Engineers;
- US Environmental Protection Agency;
- US Fish and Wildlife Service; and
- National Marine Fisheries Service.

Caltrans proposes the following parameters for the off-site mitigation:

- USFWS would be fully responsible for designing, constructing, monitoring and managing the habitat creation and/or restoration;
- USFWS would be responsible for obtaining all necessary local, state and federal permits and completing any required environmental compliance including endangered species consultation;
- The habitat creation and/or restoration would be consistent with the recommendations of the Baylands Ecosystem Habitat Goals and should include eelgrass and sand flat habitat to the extent practicable;
- The habitat creation and/or restoration should be planned and designed to be self-sustaining over time to the extent possible;
- The acquisition and restoration funds should be used for replacing the functions and values of aquatic habitat and not to finance non-mitigation programs (e.g., education projects or research); and

- The area encompassed by the habitat creation and/or restoration should be protected in perpetuity with appropriate real estate arrangements (e.g., conservation easements, transfer of title to federal or state resource agency or non-profit conservation agency).

Timing of Mitigation

The first phase of mitigation, which involves harvesting and transplanting eelgrass, would occur prior to dredging for the Oakland Approach Structures contract. The remaining on-site eelgrass mitigation cannot be fully implemented until project completion, which would take approximately seven years. Sand flat mitigation could begin once the Geofill contract has been completed and the rock slope protection installed at the Oakland Touchdown. Establishment of the acquisition and restoration fund could be implemented prior to construction of the Skyway contract. Implementation of off-site mitigations at Skaggs Island depends on several factors including USFWS obtaining site control, preparing an appropriate plan, conducting environmental review and obtaining necessary regulatory permits.

BLOCK 22

ADDRESSES OF ADJOINING PROPERTY OWNERS, LESSEES, ETC.

The following entities own property within or adjacent to the project area:

United States Navy
Assistant Secretary of the Navy,
Installations and Environment,
1000 Navy Pentagon
Washington, D.C. 20360-5000

United States Army
Oakland Army Base
Oakland, CA 94626

United States Coast Guard
Coast Guard Island
Building 54D
Alameda, CA 94501-5100

The Port of Oakland
530 Water Street
Jack London Square
P.O. Box 2084
Oakland, CA 94604-2064

The Port of San Francisco
Ferry Building
San Francisco, CA 94111

The City of Oakland
City Hall
One City Hill Plaza
Oakland, CA 94612

The State of California
Department of Transportation
District 4
111 Grand Avenue
Oakland, CA 94612

East Bay Municipal Utility District
P.O. Box 24055
Oakland, CA 94623-1055

BLOCK 23

CERTIFICATIONS/DENIALS RECEIVED FROM OTHER AGENCIES (State, Local, and Federal)

Agency Approvals and Certifications Summary		
Agency and Approval Required	Date of Submittal	Status
FHWA Record of Decision	EIS submitted 5/8/01.	Record of Decision issued 7/11/01.
EPA LEDPA Determination	LEDPA analysis submitted 1/27/01.	LEDPA determination granted 3/15/01 (see letter in Appendix A).
Permit to discharge at SF-DODS site.	Submittal to EPA is forthcoming.	Authorization is pending.
USFWS Section 7 Consultation (Endangered Species)	Biological Assessment submitted 7/99.	Letter of 8/31/99 found that Section 7 Consultation was not required.
NMFS Section 7 Consultation (Endangered Species)	Biological Assessment submitted 7/99.	Letter of 9/24/99 concluded informal consultation.
Incidental Harassment Authorization – Marine Mammals	Submittal to NMFS is forthcoming.	Authorization is pending.
Incidental Take Statement – Fish	Submittal to NMFS is forthcoming.	Authorization is pending.
U.S. ACOE LEDPA Determination	LEDPA analysis submitted 1/27/01.	LEDPA determination granted 2/12/01 (see letter in Appendix A).
Permit to discharge to wetlands and Waters of the U.S.	ACOE permit application submitted September 13, 2001.	Concurrence with 404 b(1) Alternatives Analysis obtained 3/15/01 (see letter in Appendix A).

Block 23 - Certifications/Denials Received from Other Agencies

Agency Approvals and Certifications Summary		
U.S. Coast Guard Permit to construct new bridge piers only.	Permit application submitted 5/24/01.	USCG is reviewing application.
BCDC Permit to dredge and place fill within San Francisco Bay.	Permit application submitted September 13,2001	Authorization is pending.
CEQA	Project is exempt by statute from the requirements of CEQA (see Section 1).	Statutory exemption issued in 1998.
DMMO	Consultation has been conducted regarding suitability of dredged material for unconfined aquatic disposal.	Letter indicating percent of sediments SUAD and NUAD issued 10/31/00 (see letter in Appendix H). Concurrence letters from DMMO on disposal options issued 7/06/01 and 8/17/01 (see letter in Appendix H).

SECTION 3

APPENDICES

APPENDIX A

ACOE AND EPA CONCURRENCE

LEAST ENVIRONMENTALLY DAMAGING PRACTICABLE ALTERNATIVE FOR THE SAN FRANCISCO – OAKLAND BAY BRIDGE SEISMIC SAFETY PROJECT

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
333 MARKET STREET
SAN FRANCISCO, CALIFORNIA 94105-2197

REPLY TO
ATTENTION OF:

FEB 12 2001

Regulatory Branch

SUBJECT: File Number 23013S: San Francisco-Oalkand Bay Bridge Seismic Safety Project

Ms. Mara Melandry
California Department of Transportation
111 Grand Avenue
Oakland, California 94623-0660

Dear Ms. Melandry:

This letter is in response to your submittals of January 22 and January 27, 2001 regarding the San Francisco-Oakland Bay Bridge Seismic Safety Project. The January 22, 2001 submittal requests the Corps' agreement with the conceptual mitigation plan that is included in that submittal. The submittal of January 27, 2001 is for the Corps' agreement that the N-6 alternative, for a new east span of the Bay Bridge, is the least environmentally damaging practicable alternative (LEDPA) based on the 404(b)(1) alternatives analysis that is included with the submittal.

After reviewing the above information, the Corps agrees with the conceptual mitigation and agrees that the N-6 alternative is the LEDPA. Please be advised that the Corps will not issue a public notice for the proposed project until a detailed mitigation plan is submitted to and approved by the Corps. A discussion of the mitigation will be included in the public notice.

Should you have any questions please call Mr. Rob Lawrence of our Regulatory Branch at (415) 977-8447. If you wish to write, please address all correspondence to Mr. Rob Lawrence, Regulatory Branch and refer to the file number at the head of this letter.

Sincerely,

Calvin C. Fong
Chief, Regulatory Branch

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

EXECUTIVE OFFICE
01 MAR 23 AM 10: 12

MAR 15 2001

Mr. Harry Y. Yahata
District Director
Caltrans – District 4
111 Grand Avenue
P.O. Box 23660
Oakland, CA 94623

Dear Mr. Yahata:

This letter responds to your letter of January 17, 2001, in which you requested our concurrence, under the NEPA/Clean Water Act Section 404 Integration Process MOU (NEPA/404 MOU), on the least environmentally damaging practicable alternative (LEDPA) for the **San Francisco Bay Bridge East Span Seismic Safety Project**. It also responds to your letter of January 22, 2001, which requested our views regarding the adequacy of the conceptual mitigation plan for the subject project.

In response to your request regarding the LEDPA, we have reviewed your January 2001 document entitled "Alternatives Analysis and Compliance with Section 404(b)(1) Guidelines." That document describes and analyzes a broad range of alternatives and concludes that Replacement Alternative N-6 is the least environmentally damaging practicable alternative . Based on our review of your analysis, and conversations with your staff and representatives of the Army Corps of Engineers and the U. S. Fish and Wildlife Service, we concur that Replacement Alternative N-6 is the LEDPA. We believe Alternative N-6 would enable Caltrans to meet the project's basic purpose while reducing adverse project impacts to aquatic resources to an acceptable level.

We have reviewed your conceptual mitigation plan of November 2000. We also have discussed this conceptual plan with your staff on several occasions. Based on this review and these discussions, we believe the conceptual mitigation plan identifies appropriate measures, both on-site and off-site, to reduce and offset unavoidable project impacts to non-tidal wetlands, inter-tidal sand flats, and eelgrass. We are particularly interested in the off-site mitigation feature that Caltrans proposes to undertake at the Bruener property. According to your January 22, 2001 letter, this mitigation will consist of creating 64.35 acres of tidal marsh ecosystem. We believe this proposal is sound and should be pursued, although many details will need to be resolved during the development of the final mitigation plan. If, for any reason, it is not possible to implement the off-site mitigation plan at the Bruener property, Caltrans should undertake mitigation of a similar nature and size at the Liquid Gold site or at some other suitable

site. We are available to work with your staff to ensure that the final mitigation plan satisfies these commitments and addresses all pertinent issues.

If you have questions regarding these comments, please contact Michael Monroe of our Wetlands Regulatory Office at (415) 744-1963, or Nova Blazej of my staff at (415) 744-2089.

Sincerely,

Lisa B. Hanf, Manager
Federal Activities Office

cc: B. Batha, BCDC, San Francisco
C. Fong, USACE, San Francisco
M. Littlefield, USFWS, Sacramento
J. West, SFBRWQCB, Oakland
C. Wilcox, CDFG, Yountville

APPENDIX B

ALTERNATIVES ANALYSIS
PURSUANT TO THE CLEAN WATER ACT SECTION 404 (b)(1) GUIDELINES

San Francisco-Oakland Bay Bridge East Span Seismic Safety Project
Alternatives Analysis and Compliance with Section 404(b)(1) Guidelines
January, 2001

This evaluation is based on guidelines developed in the Memorandum of Understanding for the NEPA and Section 404 Integration Process for Surface Transportation Projects in Arizona, California, and Nevada.

1.0 PROJECT DESCRIPTION AND PROJECT PURPOSE AND NEED

Pursuant to the NEPA/404 Integration Memorandum of Agreement (MOU), the project Purpose and Need Statement was developed through a collaborative process among federal agencies and other non-signatory participating agencies. Under the MOU process, the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), U. S. Army Corps of Engineers (ACOE), U.S. Environmental Protection Agency (EPA), and the Federal Transit Administration (FTA) concurred on the project purpose and need statement, the range of alternatives, and the criteria for alternative selection.

The SFOBB East Span Project (see Figure 1) would provide a seismically upgraded vehicular crossing for current and future users. The proposed project seeks to retrofit or replace the existing San Francisco-Oakland Bay Bridge (SFOBB) East Span to provide a lifeline[5] vehicular connection that:

Connects YBI in San Francisco and the SFOBB Toll Plaza in Oakland;

Connects to a lifeline route linking the East Bay, San Francisco, and the San Francisco Peninsula;

Maintains the current vehicular capacity of the existing East Span;

Provides for safety of bridge users during a maximum credible earthquake (MCE)[6]; and

Improves operational and safety design to meet current standards to the greatest extent possible.

SFOBB East Span Project replacement bridge alternatives would not preclude a bicycle/pedestrian path.

[5] A lifeline connection provides for post-earthquake relief access linking major population centers, emergency relief routes, emergency supply and staging centers, and intermodal links to major distribution centers. A lifeline connection on the SFOBB East Span would provide a bridge that will be serviceable soon after an MCE.

[6] An MCE is the largest earthquake reasonably capable of occurring, based on current geological knowledge. Caltrans has projected the MCE for the SFOBB East Span as a magnitude 8 (Richter scale) on the San Andreas fault or 7¼ on the Hayward fault. While earthquakes are often described in terms of their magnitude, designers prefer to describe the rock motions that a given earthquake would generate at a specific project site. Project designers for the East Span Project are designing the bridge to withstand an earthquake with a 1,500-year return period. This is defined as an earthquake that generates rock motions expected to occur at the bridge site an average of once every 1,500 years, or ten times the projected 150-year life span of the replacement bridge. The Seismic Safety Peer Review Panel and the ground motion subcommittee of the Metropolitan Transportation Commission's Engineering and Design Advisory Panel considered it appropriate to design the bridge for these ground motions.

The project addresses the following major transportation needs and deficiencies identified specifically on the bridge between YBI and the SFOBB Toll Plaza:

Lifeline Connection - The existing SFOBB East Span does not provide a lifeline connection that is likely to survive or be usable after an MCE;

People, Freight and Goods Movement - The existing SFOBB East Span is likely not to allow for high levels of people, freight, and goods movement following an MCE; and

Current Roadway Design Standards - The existing SFOBB East Span does not meet current roadway operational and safety design standards.

2.0 PROJECT ALTERNATIVES

The range of alternatives considered was established by Caltrans and the Federal Highway Administration (FHWA) in accordance with NEPA requirements and in consultation with permitting and regulatory agencies under guidance of the NEPA/404 MOU. Caltrans considered and performed preliminary engineering on a range of possible project alternatives for the East Span Project. The following alternatives were considered in the Draft Environmental Impact Statement:
No-Build;
Retrofit Existing Structure;
Replacement Alternative N-2;
Replacement Alternative N-6; and
Replacement Alternative S-4.

2.1 No-Build Alternative

The No-Build Alternative would retain the existing SFOBB East Span. The No-Build Alternative assumes that some seismic improvements to the East Span have been completed under the Interim Retrofit Project. The Interim Retrofit Project strengthened bents and columns on the viaduct section at YBI and strengthened or stiffened columns, bents, and trusses at selected locations on the structure, so that the existing East Span would be able to withstand a smaller and more likely earthquake. This was completed during summer 2000. The No-Build Alternative was evaluated primarily as a basis for comparison with the build alternatives. However, the No-Build Alternative does not satisfy the project purpose and need.

2.2 Retrofit Existing Structure Alternative

The Retrofit Existing Structure Alternative would retrofit the existing bridge to withstand an MCE. The seismic retrofit strategy would strengthen and stiffen the substructure (below deck, towers, and foundations). This work would include additional large diameter piles and new pile caps around the existing foundations, isolator bearings at the top of the towers, and new piers and trusses. Two new large deepwater piers would be added to the cantilever span. A space frame to restrict deformation would extend from the base of the lower deck to the bottom of the upper deck on the outside of the cantilever section. However, the bridge would still experience substantial damage in the event of an MCE, likely rendering it unusable for post-earthquake recovery efforts. Thus, the Retrofit Existing Structure Alternative would not meet the lifeline criteria. Also, this alternative could not provide standard lane widths and emergency roadway shoulders to meet current highway design standards on the existing bridge.

Due to the limitations of the Retrofit Existing Structure Alternative, it does not fully satisfy the project purpose and need. Therefore, it is not included in this alternatives analysis.

2.3 Replacement Alternative N-2

Replacement Alternative N-2 would involve constructing a new bridge (two-side-by-side bridge decks, each deck consisting of five lanes) north of the existing alignment and dismantling the existing structure. The alternative has been designed to minimize the length of the new bridge by closely following the alignment of the existing East Span. East of the YBI tunnel, the alignment would transition from a double-deck viaduct structure to two parallel structures. The 3,585-meter (11,759-foot) long span would reach the Oakland shore along the northern edge of the existing Oakland Touchdown area and conform to the existing traffic lanes to the west of the SFOBB Toll Plaza. Replacement Alternative N-2 would include a bicycle/pedestrian path on the south side of the eastbound structure. The path would be 4.7-meters (15.5-feet) wide and 0.3 meter (1 foot) higher than adjacent lanes. The proposed design includes a self-anchored suspension bridge over the navigation channel. A bridge tower would be constructed as part of the structural system for the self-anchored suspension bridge. At the tower location for this alternative, the bedrock is approximately 11-14 m (36-46 feet) below the mudline.

On completion of the replacement structure, the existing East Span would be dismantled. The steel spans would be dismantled and transported on barges to land. The concrete piers would be removed to below the mud line.

This alternative would meet the project purpose and need.

2.4 Replacement Alternative N-6

Replacement Alternative N-6 is similar to Replacement Alternative N-2, but the proposed bridge would be aligned further north of the existing structure than Replacement Alternative N-2. This alternative has been designed to maximize views to the north of YBI while minimizing construction in portions of the Bay where geologic conditions increase the complexity and cost of constructing bridge piers. The overall length of Replacement Alternative N-6 is approximately 3,620 meters (11,877 feet). The alignment approaching the Oakland Touchdown area is similar to Replacement Alternative N-2. Replacement Alternative N-6 would include a bicycle/pedestrian path on the south side of the eastbound structure. The path would be 4.7-meter (15.5-feet) wide and 0.3 meter (1 foot) higher than adjacent traffic lanes. The proposed design includes a self-anchored suspension bridge over the navigation channel. At the tower location for this alternative, bedrock is approximately 6-9 m (20-30 feet) below the mudline.

On completion of the replacement structure, the existing East Span would be dismantled. The steel spans would be dismantled and transported on barges to land. The concrete piers would be removed to below the mud line.

This alternative would meet the project purpose and need.

2.5 Replacement Alternative S-4

Replacement Alternative S-4 would be located south of the existing East Span. The 3,550-meter (11,644-foot) long span would reach the Oakland shore south of the existing East Span and transition to the existing roadway west of the toll plaza. Replacement Alternative S-4 has been developed to avoid offshore conflicts with the existing East Bay Municipal Utility District (EBMUD) sewer outfall, which parallels the existing East Span to the south. Replacement Alternative S-4 would include a bicycle/pedestrian path on the south side of the eastbound structure. The path would be 4.7-meter (15.5-feet) wide and 0.3 meter (1 foot) higher than adjacent traffic lanes. The proposed design includes a self-anchored suspension bridge over the navigation channel. At the tower location for this alternative, bedrock is approximately 67-71 meters (220-233 feet) below the mudline.

On completion of the replacement structure, the existing East Span would be dismantled. The steel spans would be dismantled and transported on barges to land. The concrete piers would be removed to below the mud line.

This alternative would meet the project purpose and need.

3.0 ADDITIONAL ALTERNATIVES

Caltrans considered several other project alternatives that were ultimately withdrawn from further consideration. The alternatives and the reasons for withdrawal are identified in the Environmental Impact Statement and are summarized below.

3.1 Replacement Alternative N-1

Replacement Alternative N-1 is a 3,685-meter (12,087-foot) long replacement alternative located to the north of Replacement Alternative N-6. However, based on geologic data, it was determined that approximately one-half of the alignment would fall within areas of deep young Bay mud, increasing the complexity, schedule, and cost of constructing the bridge substructure while potentially reducing seismic performance. Therefore, Replacement Alternative N-1 was withdrawn from further consideration.

3.2 Replacement Alternative N-3

Replacement Alternative N-3 is located to the south of Replacement Alternative N-6. Replacement Alternative N-3 would place the main span tower close to YBI, where geologic conditions are most favorable for the tower footing, thus facilitating the construction schedule by reducing the amount of in-Bay excavation. However, the tower location would require the roadway horizontal and vertical alignments to be modified to less than optimum configurations, resulting in restricted sight distances, which would affect driver response and safety. Therefore, Replacement Alternative N-3 was withdrawn from further consideration.

3.3 Replacement Alternative N-4

Replacement Alternative N-4, a modification of Replacement Alternative N-3, provides a 180-meter (591-foot) tangent (straight) roadway section at the YBI tunnel approach on the westbound alignment. This alternative was designed to satisfy safety standards by preventing westbound traffic from entering the tunnel portal on a curve. However, the deep-water location of the main span tower would result in increased project costs and a lengthened construction schedule. Therefore, Replacement Alternative N-4 was withdrawn from further consideration.

3.4 Replacement Alternative N-5

Replacement Alternative N-5, a modification of Replacement Alternative N-3, consists of a larger curve radius for the westbound alignment entering the YBI tunnel portal. This would reduce or eliminate sight distance concerns. However, based on the desire to place a tangent roadway section at the westbound alignment approach to the YBI tunnel portal for driver safety, and the need to place the main span tower as close to YBI as possible for project cost reasons, Replacement Alternative N-5 was withdrawn from further consideration.

3.5 Replacement Alternative S-1

Replacement Alternative S-1 was defined as the most direct alignment between YBI and the Oakland Touchdown. This alternative is similar to the southern alternative proposed by the City and County of San Francisco. This alternative would affect the EBMUD sewer outfall that is aligned south of the existing span. EBMUD is concerned that construction of this alternative and the transverse crossing of the outfall in the Bay could cause both short- and long-term damage to its facility and increase complexity of its maintenance activities. Therefore, Replacement Alternative S-1 was withdrawn from further consideration.

3.6 Replacement Alternative S-2

Replacement Alternative S-2 provides broader radius curves than Replacement Alternative S-1 at the YBI Tunnel approaches, avoiding the need for design exceptions. This alternative would avoid offshore conflicts with the EBMUD outfall. However, staging to maintain five lanes of traffic in each direction would require construction of temporary detours eastward where they would connect to the cantilever section of the existing East Span. The tie-in of temporary detours to the cantilever section would be complex and could compromise structural integrity of the existing East Span. Therefore, Replacement Alternative S-2 was withdrawn from further consideration.

3.7 Replacement Alternative S-3

Replacement Alternative S-3 is a refinement of Replacement Alternative S-1, which would also eliminate the need for design exceptions for superelevation of roadway curves. However, this alternative would require construction of temporary detours similar to those described for Replacement Alternative S-2, raising concerns for the structural integrity of the existing East Span cantilever section. Therefore, Replacement Alternative S-3 was withdrawn from further consideration.

4.0 PRACTICAL PROJECT ALTERNATIVES ANALYSIS

Each of the proposed replacement alternatives (Replacement Alternatives N-2, N-6 and S-4) would meet the project purpose and need as summarized above. These replacement alternatives have been carried forward for an analysis of practicability under the Clean Water Act. The Environmental Protection Agency and the Army Corps of Engineers have implemented regulations at 40 CFR 230, "Section 404(b)(1) Guidelines for Specification of

Disposal Sites for Dredged or Fill Material," which regulate discharges of dredged or fill material into waters of the United States. The guidelines state in part:

"a. Except as provided under section 404(b)(2), no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences.

1. For the purpose of this requirement, practicable alternatives include, but are not limited to:
   i. Activities which do not involve a discharge of dredged or fill material into the waters of the United States or ocean waters;
   ii. Discharges of dredged or fill material at other locations in waters of the United States or ocean waters;
2. An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered." (40 CFR 230.10(a))

An evaluation of a project's practicability may be determined based on consideration of cost, existing technology and logistics in the context of the overall project purposes (40 CFR 230.10 (a)(2). All of the alternatives are capable of being done after taking into consideration cost and technology. The alternatives differ in terms of logistics, as discussed below.

4.1 Replacement Alternative N-2

Replacement Alternative N-2 can be constructed at a cost within the project budget. This alternative is capable of being done based on current technology. It would permanently take land owned by the Port of Oakland on the north shore of the Oakland Touchdown; the Port does not have plans to develop this land, and the Port supports northern alignments for the East Span Project. Replacement Alternative N-2 would also take land on the north side of the Oakland Touchdown that is designated as a Resource Conservation Area by the City of Oakland; however, the City of Oakland supports northern alignments for the East Span Project that would result in taking this land. Similarly, land use issues are not a logistical impediment to this alternative on Yerba Buena Island (YBI); Caltrans recently acquired fee and easement rights to Navy land necessary to build all project alternatives, and land not necessary for the East Span Project will be relinquished following project construction. The land relinquished by Caltrans will be available for development by others.

In terms of construction activities, Replacement Alternative N-2 would require the placement of engineered fill at the Oakland Touchdown; this construction activity does not appreciably increase construction complexity. The dredged barge access channel would cross an in-Bay gas pipeline and an in-Bay electrical line that would need to be protected in place; protecting these utilities would add to project costs but would not make this alternative harder to construct. The main span tower would be founded on bedrock that is approximately 11-14 meters (36-46 feet) deep; this is not a substantial construction obstacle. These construction activities required for Replacement Alternative N-2 do not make this alternative harder to construct relative to the other project alternatives.

Logistically, there are no major impediments to construction of Replacement Alternative N-2.

4.2 Replacement Alternative N-6

Replacement Alternative N-6 is very similar to Replacement Alternative N-2. It can be constructed at a cost within the project budget. It is capable of being done based on current technology. The land required for Replacement Alternative N-6 is essentially the same as that required for N-2 (see above). There are no impediments to obtaining rights to construct this alternative at the Oakland Touchdown, and Caltrans currently has the necessary rights to construct this alternative on YBI.

As with Replacement Alternative N-2, Replacement Alternative N-6 would also require the placement of engineered fill at the Oakland Touchdown. The dredged barge access channel would cross two in-Bay utilities that would need to be protected in place, adding incrementally to project costs. The main span tower would be founded on bedrock that is approximately 6-9 meters (20-30 feet) deep, or somewhat shallower than the depth for Replacement Alternative N-2. These construction activities do not make this alternative harder to construct relative to the other project alternatives.

Logistically, there are no major impediments to construction of Replacement Alternative N-6.

4.3 Replacement Alternative S-4

Replacement Alternative S-4 can be constructed at a cost within the project budget. It is also capable of being done based on current technology. However, Replacement Alternative S-4 is not practicable because of the logistics of both land use conflicts and construction complexities. Replacement Alternative S-4 would:

Permanently take land from an operating United States Coast Guard (USCG) facility, constraining the facility's operations;
Permanently take land from a proposed park;
Affect facilities associated with a large sewer outfall and potentially affect the outfall itself; and
Be substantially more difficult for tower construction than the other alternatives.

4.3.1. United States Coast Guard:

On YBI, there is a logistical impediment to Replacement Alternative S-4. While Caltrans recently acquired fee and easement rights to Navy land necessary to build all project alternatives, Replacement Alternative S-4 would also take land from a portion of the USCG facility on YBI. This facility performs search and rescue operations, maintains a Vessel Traffic Service, and maintains and repairs Coast Guard boats and aids to navigation. The USCG coordinates over 2000 local emergency response requests each year. In 1999 alone, its YBI facility saved 180 lives and over $34 million in property. Its Vessel Traffic Service is essential for the safe passage of large ocean-going ships (such as those moving daily to and from the Ports of Oakland and San Francisco) and is important in protecting the Bay environment by averting maritime accidents. In a letter to Caltrans dated October 18, 2000, the USCG stated that a southern alignment for the East Span Project (such as Replacement Alternative S-4) would severely restrict USCG's flexibility to utilize that part of its already limited footprint. It further stated that a southern alignment would constrain USCG's ability to effectively conduct emergency service operations from YBI.

4.3.2. Proposed Gateway Park:

At the Oakland Touchdown, another land use conflict presents a logistical impediment. Replacement Alternative S-4 would permanently take land from the United States Army's Oakland Army Base. It would take approximately 3 hectares (7.4 acres) of a 5.9-hectare (14.7-acre) parcel designated by the Oakland Base Reuse Authority for a proposed public park. The proposed Gateway Park was determined by FHWA to be protected by the provisions of Section 4(f) of the Department of Transportation Act. Under Section 4(f), the Secretary of Transportation may approve a transportation project requiring the use of publicly owned land of a public park only if there is no prudent and feasible alternative to using that land, and the project includes all possible planning to minimize harm to the park. FHWA's implementing regulations (771.135(a)(2)) state the following about prudent and feasible alternatives:

"(2) Supporting information must demonstrate that there are unique problems or unusual factors involved in the use of alternatives that avoid these properties or that the cost, social, economic, and environmental impacts, or community disruption resulting from such alternatives reach extraordinary magnitudes."

Replacement Alternatives N-2 and N-6 were not found to involve unique problems, unusual factors or environmental impacts that reach extraordinary magnitudes. Therefore, Replacement Alternatives N-2 and N-6 are prudent and feasible alternatives that avoid the use of the public park by Replacement Alternative S-4.

4.3.3. EBMUD's dechlorination facility:

Conflicts with the service road to the East Bay Municipal Utility District's (EBMUD's) dechlorination facility at the Oakland Touchdown present another logistical impediment to Replacement Alternative S-4. EBMUD operates a wastewater treatment plant east of the Bay

Bridge Toll Plaza. A sewer outfall moves treated wastewater from the wastewater treatment plant to a dechlorination facility at the west end of the Oakland Touchdown. From there the outfall moves the dechlorinated wastewater to a diffuser one mile off the East Bay shore in central San Francisco Bay where the water is discharged. The wastewater treatment plant and outfall provide water treatment and discharge for over 610,000 people living along the east shore of San Francisco Bay.

The dechlorination facility is a critical element to the operation of the wastewater treatment plant. Currently, sodium hyperchlorite is added to the effluent at the wastewater treatment plant and the chlorinated effluent is then moved slowly toward the dechlorination facility, where the chlorine is removed from the secondary treated effluent to meet the requirements of EBMUD's permit from the Regional Water Quality Control Board. The dechlorination facility operates 24 hours a day, 7 days a week. It is monitored hourly by EBMUD personnel, who access the facility via a service road, traveling from the treatment plant to the dechlorination facility and back. The outfall itself is a 2.8-meter (9-foot) diameter concrete pipeline; it is a zero-load facility, which means that it cannot support any weight and must be protected or spanned to prevent damage. Replacement Alternative S-4 would place a portion of the westbound bridge structure and a portion of the approach fill for the eastbound bridge structure over the service road to EBMUD's dechlorination facility. It would also span the concrete outfall pipeline.

Although Replacement Alternative S-4 would not directly require the removal of the dechlorination facility, it would place the bridge structure over the existing service road to the facility. The vertical clearance between the bridge structure and the existing service road would be insufficient to allow service vehicles to reach the dechlorination facility. Consequently, under Replacement Alternative S-4 the service road would need to be relocated. This could be accomplished in various ways:

A. Relocate the existing access road to the south.
Constructing the roadway far enough south to provide sufficient vertical clearance beneath the roadway would require building the roadway on new fill in the Bay. This additional discharge into waters of the United States was not included in the fill quantities calculated for construction of Replacement Alternative S-4 itself. The area of new fill would be approximately hectares (0.9 acres) and the volume would be approximately 13,650 cubic meters (18,000 cubic yards).

B. Lower the grade of the existing service road to create a tunnel beneath Replacement Alternative S-4.
This would essentially require construction of a tunnel. The water table is very high at the Oakland Touchdown, making a tunnel here susceptible to flooding and requiring a pump system to keep the service road open at all times. A tunnel would also require ventilation, lighting, safety measures and long-term maintenance. Caltrans would likely incur ongoing responsibilities for maintaining the tunnel roadway, pumps, lighting and ventilation, adding to Caltrans' long-term maintenance operations.

C. Build an overpass structure over Replacement Alternative S-4.
This two-lane structure would be about 250 meters long. Based on the typical cost per square foot, the structure alone would cost approximately $4 to 7 million; this does not include the cost of retaining walls and approach embankments required to complete the overpass. Such a structure would also be opposed by the Bay Conservation and Development Commission on grounds that it would reduce visual public access to the Bay.

Relocating the dechlorination facility to retain service access was also considered. The options for relocating the dechlorination facility also present logistical impediments. Moving it to the south or north, away from the alignment of the outfall pipeline, would require relocation of at least part of the onshore pipeline while keeping it operational at all times and preventing accidental discharge of effluent. Moving the dechlorination facility to the south or west would also require additional fill in the Bay to support it. Moving it to the west or north would not eliminate the need for the service road to still be routed under or over the highway traffic lanes, as described above. Relocating it about 500 meters (about 1600 feet) eastward along the existing pipeline alignment, so that it is east of Replacement Alternative S-4, would reduce about 500 meters (1600 feet) of distance over which the sodium hyperchlorite has contact with the effluent. EBMUD's discharge operations would need to be modified to effectively provide the same treatment to the effluent over a shorter distance; it is not clear whether this could be achieved.

4.3.4. EBMUD's sewer outfall:

Conflicts with EBMUD's sewer outfall also present a logistical impediment to Replacement Alternative S-4. The alignment of Replacement Alternative S-4 would obliquely cross an onshore portion of the outfall pipeline. The skew angle between the roadway alignment and the outfall pipeline, buried under minimal cover from 0.5 to 1.5 meters (2 to 5 feet) deep, would result in a conflict area on land that is approximately 400 meters (1,300 feet) long. Protecting and avoiding this 2.8-meter (9-foot) diameter, zero-load pipeline would substantially increase construction complexity in this area, in terms of both bridge design and constraints on the contractor. It would also hamper any future inspections and repairs of either the outfall or the bridge.

Designing the bridge alignment to avoid the outfall would require that the structure piers and foundations straddle the outfall at a highly skewed angle. The straddle design foundation of the new structure would change at each pier along the length of the outfall and result in a higher cost of design and construction. Skewing the bridge structure foundations could also potentially create the need for skewed deck joints.

The contractor would need to develop techniques at the site to either protect the pipeline in place or construct falsework to span it; this would apply both to the roadway structure itself and all contractor movements during construction. As a result, the contractor's movements and options for construction would be constrained, and movements that would normally be available on a construction site would be eliminated. The special protection/spanning techniques and the constraints on activities would in turn reduce available staging for the construction operation, in an area where staging for this scale of construction is already very limited. The need to develop special techniques to work around the pipe, the restriction of contractor movement and the reduced staging area would all work to increase both construction time and cost. And while these efforts are intended to protect the pipeline from damage, the construction activities around and over the pipeline would still increase the risk of possible damage. If the pipeline were damaged during construction, secondarily treated effluent containing elevated levels of sodium hyperchlorite could be prematurely released into the Bay, affecting water quality and likely generating fines for violation of EBMUD's water quality permit; repair of the facility would be difficult and would further delay implementation of this safety project.

Once Replacement Alternative S-4 spans the zero-load pipeline, that portion of the pipeline would be very difficult to access for any possible future repairs. Similarly, the presence of the pipeline would hamper any future subsurface investigations of the bridge itself, such as may be desirable following a major seismic event.

Replacement Alternatives N-2 and N-6 avoid the multiple construction risks and complexities associated with the conflicts that Replacement Alternative S-4 has with EBMUD's sewer outfall facilities.

4.3.5. Tower construction:

There is a further logistical impediment related to construction complexities. At the tower location for Replacement Alternative S-4, the depth to bedrock is 67-71 meters (220-233 feet), as compared to 11-14 meters (36-46 feet) for Replacement Alternative N-2 and 6-9 meters (20-30 feet) for Replacement Alternative N-6. As a result of the considerably greater depth to bedrock to found the main tower for Replacement Alternative S-4, construction of this alternative would be much more difficult as compared to construction of Replacement Alternatives N-2 and N-6. The tower would need to be longer to reach bedrock, thereby subjecting it to greater stresses in an earthquake. Its design would therefore need to be more massive to provide the same seismic resistance provided by a shorter tower for Replacement Alternative N-2 or N-6. The foundation would also need to be more massive, to support the longer and more massive tower. The greater depth to bedrock and the larger foundation together would increase the area of excavation and the quantity of excavated material requiring disposal. Placing a key structural element of the bridge in over 60 meters (200 feet) of soft sediments presents substantial logistical challenges during construction.

4.4. Summary

In summary, Replacement Alternative S-4 takes land from an operating USCG facility, thereby constraining the mission of that facility; it uses land from a Section 4(f) resource (Gateway Park) for which there are prudent and feasible alternatives that avoid that use; it compromises the operation of an important sewer outfall that serves over 610,000 people along the east side of the Bay; it results in more complex construction to protect that outfall; and it results in more extensive and more difficult in-Bay construction because of considerably greater depth to bedrock. As a result of these logistical impediments, Replacement Alternative S-4 does not meet the standards for practicability as defined in the 404 guidelines. It is therefore removed from further consideration in the 404(b)(1) analysis.

5.0 IMPACTS TO THE AQUATIC ENVIRONMENT

5.1 Special Aquatic Sites

The two replacement alternatives carried forward in the Alternatives Analysis would result in permanent fill of special aquatic sites that are under the jurisdiction of the U.S. Army Corps of Engineers pursuant to Sections 404 and 401 of the Clean Water Act (see Figures 4, 5, 7, 8, 9 and 10). Impacts to eelgrass beds, sand flats, and Waters of the U.S. would occur under both of the practicable replacement alternatives.

5.1.1 Eelgrass:

Eelgrass (*Zostera marina*) is a native marine vascular plant indigenous to the soft-bottom bays and estuaries of the Northern Hemisphere. Eelgrass beds perform multiple functions within an estuarine system. They provide a nursery area for many fish species. Detritus from eelgrass is used by animals immediately adjacent to the beds, and it is also transported elsewhere in the estuary making it an important part of the detrital-based food web. Eelgrass provides substrate for epiphytic algae, invertebrates, and crustaceans, contributing to the ecosystem at multiple trophic levels. Eelgrass beds are also foraging areas for waterfowl that feed on roe and invertebrates. Eelgrass beds also stabilize shorelines and prevent erosion by dampening wave energy. They also improve water quality by collecting and filtering organic matter and sediments, acting as a nutrient pump by transferring waterborne nutrients to the sediments and invertebrates. Eelgrass beds are known to be very dynamic, changing year to year in both extent and density as a response to environmental conditions. Substantial fluctuations are not unexpected.

5.1.2 Sand flats:

The intertidal flats north of the Oakland Touchdown have sediments with a larger grain size than is typical of mudflats. This is a result of higher wave energy in this location. These intertidal flats are therefore more appropriately termed sand flats. Sand flats protect banks and upland shoreline from wave energy. Around San Francisco Bay, sand flats provide habitat for many species of invertebrates. They generally have lower densities of benthic invertebrates compared to mudflats because they occur in sites with higher wave energy and more active sediment transport. During low tide, sand flats and mudflats provide crucial foraging and roosting areas for almost one million shorebirds that utilize the Bay during the spring migration. The habitat value of the sand flats in the project area is diminished by the abrupt transitions with adjacent uplands and the lack of contiguous wetland habitats. The existing shoreline adjacent to these sand flats is protected with rock riprap and the uplands are landscaped with non-native vegetation. These characteristics reduce the potential for species to utilize the sand flats in the project area for resting, breeding and foraging.

5.1.3 Summary of impacts:

Tables 1-1 and 1-2 provide a comparison of the impacts to special aquatic sites between the practicable project alternatives, based on the October 1999 eelgrass survey by Keith Merkel and Associates. Impacts to special aquatic sites would be the same for Replacement Alternatives N-2 and N-6. As summarized in the tables, these alternatives would not result in permanent or temporary impacts to either tidal or non-tidal wetlands. However, approximately 0.22 hectare (0.55 acre) of eelgrass beds and approximately 1.36 hectares (3.36 acres) of sand flats would be permanently displaced by both of the northern alternatives.

Table 1-1
Comparison of Practicable Alternatives:
Permanent Impacts to Special Aquatic Sites

	Impacts to Special Aquatic Sites and Wetlands			
East Span Project Alternatives	Eelgrass	Sand Flats	Tidal Wetlands	Non-Tidal Wetlands
Replacement Alternative N-2	0.22 hectare (0.55 acre)	1.36 hectares (3.36 acres)	No Impact	No Impact
Replacement Alternative N-6	0.22 hectare (0.55 acre)	1.36 hectares (3.36 acres)	No Impact	No Impact

Table 1-2
Comparison of Practicable Alternatives:
Temporary Impacts to Special Aquatic Sites

	Impacts to Special Aquatic Sites and Wetlands			
East Span Project Alternatives	Eelgrass	Sand Flats	Tidal Wetlands	Non-Tidal Wetlands
Replacement Alternative N-2	0.01 hectare (0.02 acre)	0.69 hectare (1.70 acres)	No Impact	No Impact
Replacement Alternative N-6	0.01 hectare (0.02 acre)	0.69 hectare (1.70 acres)	No Impact	No Impact

5.1.4 Project impacts to eelgrass:

Permanent impacts to eelgrass would result from dredging the barge access channel at the Oakland Touchdown (see Figure 8) and construction of a barge dock on the north side of YBI near Clipper Cove.

Barge access is necessary for construction of the piles, pile caps and bridge deck; however, the water at the easternmost portion of the project area at the Oakland Touchdown is too shallow to allow access for construction barges. An access channel must be dredged (see Figures 3-1, 8 and 9). Dredging would permanently affect eelgrass beds (*Zostera marina*). A temporary dock may be constructed at Clipper Cove to transport construction equipment, supplies and workers

to and from the YBI project area. Although the dock is temporary, it would displace a limited area of eelgrass within Clipper Cove when it is constructed. Although it is expected that these areas will recolonize, there is uncertainty about the time frame and success rate for eelgrass beds to recolonize the areas affected by dredging and construction of the barge dock, even in the areas proposed for replanting. As a result of this uncertainty, this analysis uses a conservative approach that assumes that these construction activities result in permanent impacts.

Temporary impacts to eelgrass near the Oakland Touchdown would result from increased turbidity as a result of dredging. Increased turbidity from this activity would be localized. Caltrans is investigating the effectiveness and ease of maintenance of turbidity curtains to reduce this impact. Other activities that could contribute to increased turbidity are propeller wash of tugs moving barges; construction of access trestles; and pile driving for both temporary trestles and the permanent bridge structure. The increase in turbidity as a result of these activities would be minor.

At YBI, the activities that could contribute to increased turbidity are propeller wash of tugs moving barges; construction of access trestles; mud boils from the placement of engineered fill; and pile driving, though the increase from these activities would be minor. Caltrans is investigating the effectiveness and ease of maintenance of turbidity curtains to reduce this impact.

5.1.5 ***Project impacts to sand flats:***

Permanent impacts to sand flats would result from dredging of the barge access channel (see Figure 8); the placement of engineered fill for the westbound approach roadway and the Caltrans maintenance road at the Oakland Touchdown; and shading from the roadway structures at the Oakland Touchdown. Dredging for the barge access channel would permanently affect sand flats. As with the eelgrass beds, evaluating this as a permanent rather than a temporary impact is a conservative approach based on the uncertainty about the time frame in which the channel would return to its original bathymetry through natural sedimentation. Engineered fill for the westbound approach roadway and the Caltrans maintenance road would be placed along the northwest side of the Oakland Touchdown. This fill would permanently affect sand flats. Shading from the permanent roadway structures at the Oakland Touchdown would also permanently affect sand flats, though they would still be available for foraging and roosting.

Temporary impacts to sand flats would result from use of a geotube near the Oakland Touchdown. A geotube would be placed north of the Oakland Touchdown area along the outside border of the work area to facilitate dewatering, installation of wick drains, and placement of fill and surcharge for construction of the bridge approach. A geotube is a large, high-density polyethylene tube filled with excavated material and is used as a temporary tidal barrier during construction. The geotube is self-contained and can conform to the microtopography of the site. In contrast to a soil berm, the geotube would further minimize turbidity impacts by reducing the displacement of sand flats and the erosion of high-density material. Nevertheless, turbidity may occur from mud boils that result from placing engineered fill or the geotube; loss of sand or other soil materials from the geotube that is resuspended; and excavation to key rock slope protection at the toe of the new slope.

5.1.6 ***Waters of the United States:***
As defined in 33 CFR 328.3(a), the term "waters of the United States" means:

"1. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
2. All interstate waters including interstate wetlands;
3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:
i. Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
ii. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
iii. Which are used or could be used for industrial purpose by industries in interstate commerce;
4. All impoundments of waters otherwise defined as waters of the United States under the definition;
5. Tributaries of waters identified in paragraphs (a)(1)-(4) of this section;
6. The territorial seas;
7. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a)(1)-(6) of this section."

Replacement Alternatives N-2 and N-6 would place approximately 50,500 cubic meters (66,000 cubic yards) of solid fill in other Waters of the U.S. as a result of new piers and pile caps to support the new bridge structure and the new roadway at the Oakland Touchdown area. However, removal of the existing East Span would remove approximately 66,000 cubic meters (86,000 cubic yards) of fill from other waters of the U.S, resulting in a beneficial net reduction in Bay fill volume of –15,500 cubic meters
(-20,000 cubic yards).

While Replacement Alternatives N-2 and N-6 would result in a net reduction of Bay fill volume, they would also result in a net increase in the area of Bay fill. The volume of fill would be reduced because there would be fewer bridge piles in the Bay for a replacement structure than for the existing bridge. The area of fill would increase because the pile caps around the bridge piles for a replacement bridge would be larger than the existing pile caps. Replacement Alternatives N-2 and N-6 would place approximately 1.06 hectares (2.61 acres) of solid fill in other Waters of the U.S. Removal of the existing East Span would remove approximately 0.8 hectare (1.98 acres) of fill from other waters of the U.S. The net increase in the area of Bay fill for Replacement Alternatives N-2 and N-6 would be +0.26 hectare (+0.64 acre).

Replacement Alternatives N-2 and N-6 would also generate dredged material, some of which would be disposed of in Waters of the United States. The generation and reuse/disposal of dredged material is discussed below.

5.2 Generation of Dredged Materials

Replacement Alternatives N-2 and N-6 would generate dredged materials during construction. Caltrans anticipates disposing of some of this dredged material within waters of the United States. Dredging would be needed to create barge access channels, and it would also be

needed at individual pier locations. Elements of these different dredging activities influenced Caltrans' decision to propose disposal of some of the dredged material within waters of the United States, so these activities and the quantities generated are described here. The resulting proposal for reuse/disposal of dredged material follows in section 5.3.

5.2.1 Barge access channels:

For Replacement Alternatives N-2 and N-6, dredging for barge access channels would occur twice during construction: first, to provide barge access for construction of a replacement structure, and later to provide barge access for dismantling of the existing structure. The dredging for barge access would generate approximately 269,000 cubic meters (352,000 cubic yards). Approximately 153,000 cubic meters (200,000 cubic yards) would be dredged early in project construction for construction access and 116,000 cubic meters (152,000 cubic yards) would be dredged late in project construction for dismantling access. Sediments encountered while dredging the construction and dismantling access channels are expected to consist entirely of Young Bay Mud.

5.2.2 Pier locations:

Replacement Alternatives N-2 and N-6 would remove sediment at individual pier locations for construction of the new structure as well as at existing bridge piers for dismantling of the existing bridge. This activity would generate about 144,500 cubic meters (189,000 cubic yards) of material, incrementally, over many months. The amount of dredged material during construction of new piers and footings would be about 128,500 cubic meters (168,000 cubic yards), generated over a period of 35 months; this would be about 3,700 cubic meters (4,800 cubic yards) per month. The removal of existing piers would generate about 16,000 cubic meters (21,000 cubic yards) over a period of 14 months at the end of the project, or about 1200 cubic meters (1500 cubic yards) per month. Sediment removal during pier construction is expected to involve all sediment types including the upper and lower Alameda formations, Merritt Sands, and Franciscan bedrock. Only finer grained materials (Young Bay Muds and sand) would be suitable for unconfined aquatic disposal or upland reuse. Rock, coarse gravel or materials such as concrete, steel or other construction debris would be taken to appropriate upland locations for disposal or recycling.

5.3 Reuse/Disposal of Dredged Materials

5.3.1: Overview:

In the Dredged Material Management Plan (June 1999), Caltrans evaluated a number of options for reuse/disposal of dredged material. Options included beneficial reuse for tidal marsh restoration (upland wetland reuse sites), aquatic disposal (in-Bay or deep ocean), and use at landfills for daily cover.

Beneficial reuse/disposal at upland wetland reuse sites or aquatic sites is contingent upon site availability and acquiring all necessary approvals. In the event that no upland wetland reuse site, in-Bay disposal site or ocean disposal site is available or approved for use in time to accept dredged materials from the project, Caltrans may opt to beneficially reuse dredged material at landfill sites. If reuse/disposal sites become available in time for use by the project and are approved for use and cost-effective, the contractor may choose to beneficially reuse/dispose of material at such sites.

Reuse/disposal at upland wetland reuse sites or aquatic sites is also contingent upon the suitability of the material for such reuse/disposal options, as determined by the results of the sediment testing program. Any sediment not suitable for unconfined aquatic disposal or upland wetland reuse would be properly disposed of at a landfill. In its letter of October 31, 2000, the Dredged Material Management Office made the following conclusions regarding the disposal of dredged materials for the East Span Project:

Up to 248,219 cubic meters (324,680 cubic yards) of site sediments are suitable for unconfined aquatic disposal (SUAD); and

Up to 319,181 cubic meters (417,503 cubic yards) of site sediments are suitable for reuse at upland wetland reuse sites.

A combination of reuse/disposal options was found to present the best balance between environmental concerns, costs, and project timing and logistics. Caltrans proposes separate reuse/disposal options for the material dredged from the barge access channels (for both construction and dismantling) and the material dredged at the new and existing bridge piers.

5.3.2 Reuse/disposal of material from barge access channels:

The dredged material from the barge access channels comprises a majority of the materials dredged for Replacement Alternatives N-2 and N-6, and it would be generated over fairly short time frames. It is Caltrans' goal to beneficially reuse this dredged material at an available upland wetland restoration site. Two such sites have been considered: Hamilton Wetlands Restoration Site and Montezuma Restoration Project (see Figure 6).

A. Hamilton Wetland Restoration Project:

This project site is about 29 km (18 miles) from the East Span Project site, near the City of Novato (see Figure 6). The site was historically within the tidal zone of San Pablo Bay. The State of California is the sponsor of a wetlands restoration project that would restore a mix of seasonal and tidal wetlands to the site. Clean dredged material will be received to raise the elevation of levee-protected land and hasten wetland restoration. The Hamilton Wetland Restoration Project is subject to its own separate environmental compliance, in which impacts identified in its EIR/EIS would occur regardless of whether Caltrans provides dredged material to the site. Caltrans could exercise this option with no need for additional environmental compliance other than any routine transportation permits that may be required. However, this site is not yet open to receive dredged material and it may not be open when the first barge channel is dredged for the East Span Project.

B. Montezuma Wetlands Project:

This site is located in the Suisun Marsh in Solano County, about 80 km (50 miles) from the East Span Project site. This privately sponsored wetlands restoration project will accept dredged materials to restore historic tidal wetlands. The Montezuma Wetlands Project is subject to its own separate environmental compliance, in which impacts identified in its EIR/EIS would occur regardless of whether Caltrans provides dredged material to the site. Caltrans could exercise this option with no need for additional environmental compliance other than any routine transportation permits that may be required. However, this site is not yet open to receive dredged material and it may not be open when the first barge access channel is dredged for the East Span Project.

C. Other options:

As stated previously, the Hamilton Wetlands Restoration Project and the Montezuma Wetlands Project may not be open to receive dredged material when the first barge access channel is dredged for the East Span Project. Therefore, other options are also being considered for reuse/disposal of this dredged material. Caltrans may dispose of much of this dredged material at the Deep Ocean Disposal Site (SF-DODS; see Figure 6). Caltrans may also beneficially reuse some or all of this material at landfill sites as daily cover.

D. SF-DODS:

SF-DODS is located on the continental shelf, about 91 kilometers (51 nautical miles) west of the Golden Gate, at a depth of about 230 meters (760 feet)(see Figure 6). It can accept up to 3.6 million cubic meters (4.8 million cubic yards) of material per year, and has the capacity to accept all SUAD material from the East Span Project assuming the physical criteria such as grain size are met. SUAD material not meeting the physical criteria for disposal at SF-DODS would be beneficially reused at a landfill.

In addition to meeting the requirements of section 404, disposal at SF-DODS also requires a permit from the Environmental Protection Agency (EPA) in compliance with the Marine Protection Research and Sanctuaries Act. This act requires the permittee to consider feasible, practicable and environmentally superior alternatives to the use of SF-DODS if such sites are available. Use of the site also requires post-disposal monitoring, with costs to be shared among site users. Caltrans is applying to EPA for a permit to dispose at SF-DODS so that the contractor would have the option of using this disposal site.

The "Long-Term Management Strategy (LTMS) for the Placement of Dredged Material in the San Francisco Bay Region," Volume I, Final Policy FEIS/Programmatic FEIR (United States Army Corps of Engineers, October 1998), discusses potential impacts to disposal of dredged material at SF-DODS. Disposal at SF-DODS would result in increased turbidity during disposal. This would in turn create temporary, localized and minimal impacts to plankton, benthic organisms, fish, marine mammals and birds. Special status species of fish, marine mammals and birds are known to range throughout the region around SF-DODS, so they have the potential to be present at the site; however, potential impacts of disposal at SF-DODS are expected to be temporary, localized and minimal. Disposal would also create temporary, localized and minimal impacts on water quality parameters such as salinity, temperature, pH, primary nutrient production, dissolved oxygen and the concentrations of suspended particulates.

E. Landfills:

The landfill reuse/disposal option would use existing permitted facilities constructed and operated specifically for this purpose. Such facilities include Redwood Landfill, Ox Mountain Landfill, Vasco Road Landfill, Altamont Landfill, Newby Landfill and Kettleman Landfill (see Figure 6).

Through their respective permitting processes, each of the identified facilities has already met applicable federal, state and local requirements to assess and mitigate against adverse effects to the environment as well as public health and safety. This option could be exercised under existing operating permits excepting any routine transportation permits that may be required.

Even if all of the materials dredged for the entire project were taken to landfills, the volume would not have a substantial impact on the overall landfill capacity of the region. Since it is

unlikely that all of the material dredged from the barge access channels would be disposed of at landfills, impacts on landfill longevity are expected to be negligible.

5.3.3: Reuse/disposal of material dredged at pier locations:

Dredged materials generated at the individual bridge piers (authorized under the U.S. Coast Guard Bridge Permit) would generate relatively small monthly volumes. Caltrans proposes to dispose of the SUAD material (suitable for unconfined aquatic disposal) from the piers at the Alcatraz site (SF-11; see Figure 6). As with SF-DODS, SUAD material that does not meet the physical criteria for disposal at SF-11, such as grain size, would be disposed of upland.

A. SF-11:

This in-Bay disposal site is near Alcatraz Island in central San Francisco Bay, about 8 km (5 miles) from the East span Project site. It is the disposal site closest to the project.

An upper limit of 229,000 cubic meters (300,000 cubic yards) per month from all combined sources has been placed on disposal of dredged material at SF-11. The "Long Term Management Strategy for the Placement of Dredged Material in the San Francisco Bay Region" (LTMS) calls for substantial reduction of dredged material disposal in San Francisco Bay; this will lead to a reduction of the monthly limit at SF-11 to about 46,000 cubic meters (60,000 cubic yards) per month from all combined sources.

As stated previously, Replacement Alternatives N-2 and N-6 will generate about 3,700 cubic meters (4,800 cubic yards) per month, through the middle of the project schedule, at the piers for the replacement bridge. Replacement Alternatives N-2 and N-6 will also generate about 1200 cubic meters (1500 cubic yards) per month, toward the end of the project schedule, at the existing bridge piers during dismantling. These volumes are relatively small when compared to the volumes that will be generated by dredging the barge access channels. These very small monthly volumes are also well below the reduced upper limit for monthly disposal from all combined sources at
SF-11.

Generation of larger volumes of material provides an opportunity for economy of scale. It enables a reasonable expenditure of energy and funds to transport materials over greater distances. As volumes are reduced, this economy of scale disappears, substantially increasing the transport expenditure per cubic meter (cubic yard). Repeatedly transporting small monthly volumes for disposal/reuse at distant sites therefore becomes logistically impractical and costly.

In summary, the monthly volumes generated at the piers are relatively small when compared to the volumes generated by dredging the project's barge access channels. The volumes are also well below the upper limit for disposal at SF-11. Transport of such small volumes over great distances presents logistic issues. In addition, SF-11 is the disposal site closest to the project area. These factors were considered together in Caltrans' decision to propose disposing of these smaller volumes of dredged material at SF-11. The impacts of disposal at SF-11 are contingent upon the frequency of use by all combined users. At the reduced volumes proposed by the LTMS, most cumulative effects of disposal are expected to be negligible, as would be the individual contribution of the East Span Project. The cumulative effects of several disposal events over a short time frame may substantially elevate near-bottom turbidity levels. Impacts would be reduced by accurate positioning during disposal.

6.0 Evaluation of Compliance with Section 404(b)(1) Guidelines

The Clean Water Act Section 404(b)(1) Guidelines require that the practicable alternative that would involve the least adverse impact to aquatic resources be chosen unless this alternative would have other significant environmental consequences (40 CFR 230.10 (a)). This is commonly referred to as the Least Environmentally Damaging Practicable Alternative (LEDPA). Replacement Alternatives N-2 and N-6 have been determined to be practicable. Both would require the same construction methods and would result in the same impacts to aquatic resources that are regulated under Section 404 of the Clean Water Act. Because both of the practicable alternatives would result in the same fill of aquatic or wetland resources, consideration of impacts to other resources is warranted.

Project alternatives can be eliminated if they are not "reasonable" (NEPA), or if they are not "practicable" (Section 404). Under FHWA's regulations for implementing Section 4(f) of the Department of Transportation Act, documentation must address why alternatives that avoid section 4(f) resources are not "feasible and prudent" (23 CFR 771.135(j)). Section 230.10(a) of the Clean Water Act states that "…no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem so long as the alternative does not have other significant adverse environmental consequences." Other factors considered in determining the practicable alternative are the optimal location of the main span tower and the recommendation of the Metropolitan Transportation Commission of Replacement Alternative N-6 as the locally preferred alternative. In addition, Replacement Alternative N-6 would be technically more practical because the depth to bedrock for the main tower is shallower, making the alternative easier to build in terms of construction logistics.

FHWA is currently conducting an administrative review of the Final Environmental Impact Statement for this project. Replacement Alternative N-6 is FHWA's Preferred Alternative.

7.0 Avoidance and Minimization of Impacts to Special Aquatic Sites

7.1 Avoidance and Minimization of Impacts at the Project Site

Design considerations to avoid and minimize impacts to special aquatic sites include:

- The westbound roadway on the Oakland Touchdown was initially designed on a straight alignment west of the SFOBB Toll Plaza. When Caltrans determined that this alignment would bisect and significantly affect large portions of Radio Beach and intertidal habitat areas, the roadway was realigned to the south. The proposed traffic lanes would curve slightly southward, thereby reducing the amount of impact to Radio Beach, eelgrass beds, and sand flats.

- The westbound roadway on the Oakland Touchdown was initially designed on a straight In the Dredged Material Management Plan, dated June 1999, the proposed width of the barge access channel was 82 meters (270 feet). Since then, Caltrans has reduced the width of the barge access channel to 50 meters (165 feet) to minimize impacts to special aquatic sites. Caltrans has tapered the width of the channel to 45 meters (150 feet) near the Oakland Touchdown and reduced the depth of the access channel adjacent to the Oakland Touchdown from –4.3 meters (-14 feet) mean sea level to –3.7 meters (-12 feet) mean sea level, to further avoid impacts to special aquatic sites.

Caltrans would also implement special measures to minimize potential impacts during construction and protect special aquatic sites including:

- Marking environmentally sensitive areas in the field with fencing, buoys or similar devices to limit construction activities to a pre-determined area within the special aquatic sites;

- Placing geotextile fabric and plywood onto the sand flats before placing the geotube to minimize mud boils;

- Using a geotube as a dewatering berm rather than engineered fill; and

- Using temporary trestles, rather than placing temporary solid fill in the Bay, for construction access.

Possibly installing turbidity curtains to contain and reduce turbidity impacts to eelgrass. Their effectiveness and ease of maintenance at the project site are being evaluated.

7.2 Minimization of Impacts at Aquatic Disposal Sites
Aquatic dredged material disposal sites include SF-DODS (which may be used) and SF-11 (which is proposed for use).

At SF-DODS, measures to minimize impacts include accurate positioning during disposal to ensure that dredged material is confined within the disposal site boundaries so that adjacent benthic communities are not affected, and monitoring pursuant to the requirements of EPA's permit. At SF-11, accurate positioning during disposal would confine the disposed sediments to the disposal site boundaries.

7.3 Mitigation of Impacts at Aquatic Disposal Sites
Special aquatic sites that are disturbed on-site during construction would be restored on-site (see Figure 11) or replaced with off-site mitigation. On-site measures include:

Harvesting up to 0.22 hectares (0.55 acres) of eelgrass from the footprint of the barge access channel, planting test plots in adjacent eelgrass beds and monitoring to evaluate performance, and gathering data on success of planting methods;

Restoring up to approximately 0.70 hectares (1.73 acres) of the barge access channel to its preconstruction bathymetry with stockpiled dredged material and excavated sand to facilitate eelgrass colonization, and, depending on success of the pilot program, replanting with eelgrass;

Restoring approximately 0.69 hectares (1.70 acres) of sand flats that are temporarily affected by the placement of the geotube or mud boils from engineered fill;

Constructing rock slope protection in a manner that would allow sand to accrete over the rock in areas subject to tidal action. Slope gradients would be 1:3 (vertical:horizontal) at the toe of the slope and transitioning to a 1:2 gradient at mid-slope; and

Capping upper rock slope protection areas with soil and erosion control netting to provide a medium to support growth, and revegetating with appropriate native upland plants.

In addition to on-site mitigation measures, Caltrans would provide out-of-kind mitigation to offset the remainder of eelgrass and sand flat impacts by creating a new tidal marsh ecosystem. This out-of-kind mitigation would provide enhanced functions and values relative to the affected special aquatic sites.

In the Conceptual Mitigation Plan dated November 2000, two potential sites were identified as being suitable for restoration or creation of tidal marsh ecosystems. These sites include the Breuner Property, in Richmond; and the Liquid Gold Site, in Richmond.

The tidal marsh ecosystem would include creation of new mudflats, tidal channels, and tidal marsh and enhancement of existing wetlands and uplands. The synergistic effect of these complementary habitats would provide greater foraging, roosting, and breeding opportunities for many of the species that utilize the affected special aquatic sites.

The Breuner property (see figure 12) is Caltrans' preferred location for creation of a tidal marsh ecosystem. This preference is based on the availability of the land for mitigation and the site selection criteria outlined in the Conceptual Mitigation Plan. If the Breuner property is unavailable, tidal marsh, tidal channel and mudflat creation and enhancement would be implemented at the Liquid Gold site.

7.3.1 October 2000 eelgrass survey:

Caltrans recently completed a pre-construction survey for Replacement Alternative N-6. The physical survey was conducted in October 2000, with data generation and review being completed only recently. This survey has a limited purpose compared to prior surveys: it is a pre-construction survey intended to provide current data immediately prior to construction of a particular alternative to measure actual impacts to the greatest extent possible. This survey accordingly only covers the area impacted by Replacement Alternative N-6. Since the survey is not intended for purposes of alternatives analysis, it does not include areas impacted by other alternative alignments, and it was not used in the analysis of alternatives for the purposes of 404(b)(1).

As anticipated, the area occupied by the eelgrass beds at the Oakland Touchdown Area (OTA) and Yerba Buena Island (YBI) have changed due to the natural annual variability in such beds. The eelgrass beds have grown. At the present it appears that at OTA, Replacement Alternative N-6 will permanently impact 1.29 hectares (3.19 acres) of eelgrass and temporarily impact 0.15 hectares (0.36 acres) of eelgrass). At YBI, it appears that Replacement Alternative N-6 will permanently impact 0.04 hectares (0.10 acres) of eelgrass; no temporary impacts to eelgrass are anticipated at YBI. As the entire eelgrass beds have grown between 1999 and 2000, the overall percentage of the eelgrass beds impacted has not changed to any appreciable degree. As a result of the 2000 survey, Caltrans proposes to increase the area of off-site mitigation to account for the fluctuation of this dynamic resource.

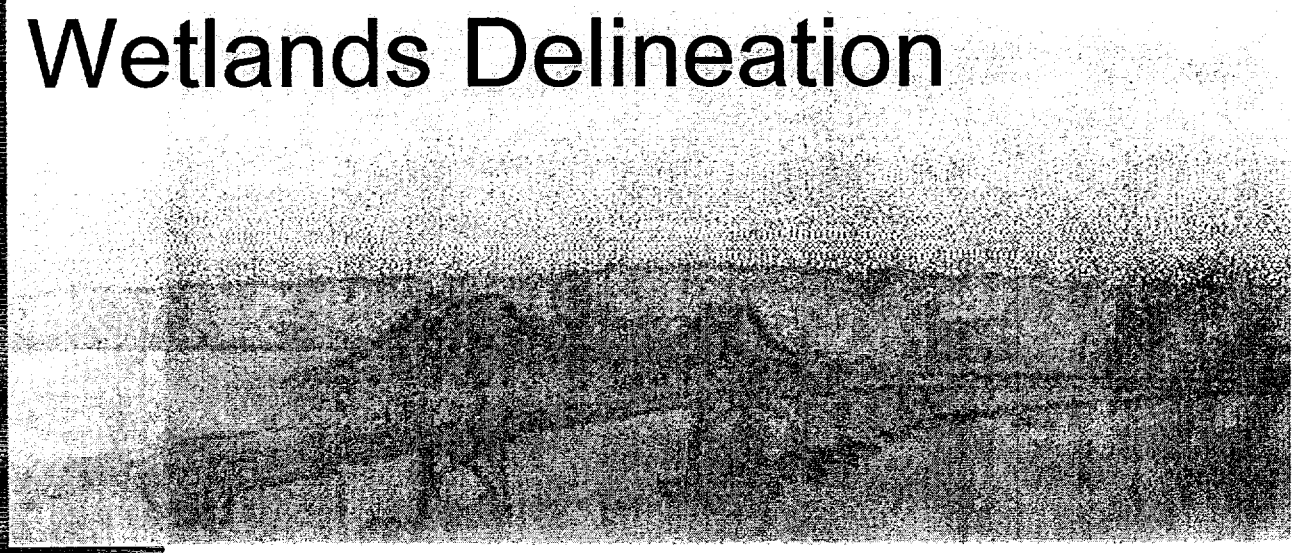
APPENDIX C

WETLAND DELINEATION
FOR THE
SAN FRANCISCO – OAKLAND BAT BRIDGE SEISMIC SAFETY PROJECT

San Francisco – Oakland Bay Bridge
East Span Seismic Safety Project

Caltrans Contract 04A0148

Wetlands Delineation



August 20,1998
Revision 0

PROJECT DESCRIPTION

The SFOBB, located on Interstate 80 in Alameda and San Francisco Counties, is a major bridge which crosses the San Francisco Bay connecting the cities of Oakland and San Francisco (Figure 1). The East Span Project involves seismic safety on the East Span of the bridge between Yerba Buena Island (YBI) and Oakland. The purpose of the project is to provide a seismically upgraded vehicular crossing for current and future users.

ALTERNATIVES

Five alternatives, No-Build, Retrofit Alternative, and Replacement Alternatives N-2, N-6, and S-4 are currently under consideration for the East Span Project. Replacement Alternatives N-2 and N-6 align approximately adjacent to the north of the existing SFOBB, while Replacement Alternative S-4 aligns south of the existing bridge. (See Figure 2 for locations of Replacement Alternatives.)

No-Build

The No-Build Alternative would retain the existing SFOBB East Span. Improvements to the SFOBB East Span under this alternative would be completed prior to selection of the East Span project preferred alternative, and are therefore considered part of the no-build condition.

Retrofit Existing Structure

This alternative would retrofit the existing East Span to withstand a major earthquake (although it would be expected to experience significant damage in a maximum credible earthquake). The alignment of the bridge would remain the same as the existing. The Retrofit Existing Structure Alternative would retrofit the existing East Span by constructing new piers to support the main span over the navigation channel, strengthening bents and columns on the viaduct section on YBI and strengthening piers, bents and trusses along the East Span structure.

Alternative N-2

Replacement Alternative N-2 has been developed to minimize the length of the new bridges by following the alignment of the existing SFOBB as closely as possible. The three structure types under consideration (see Design Variations below) can be used on Alternative N-2.

At the Oakland Touchdown area, the alignment conforms to the existing alignment to minimize the impacts to San Francisco Bay and Radio Point Beach. The overall length of Alternative N-2 is approximately 3,585 m (11,762 ft).

Alternative N-6

Replacement Alternative N-6 is the northernmost of the alignment alternatives. This alignment has been designed to maximize views to the north of YBI while providing a tangent alignment for a signature structure near YBI. The three structure types under consideration can be used on Alternative N-6.

East of the main span, the structures parallel the existing SFOBB. At the Oakland Touchdown area, the alignment conforms to the existing alignment to minimize the impacts to San Francisco Bay and Radio Point Beach. The overall length of Replacement Alternative N-6 is approximately 3,605 m (11,827 ft).

Alternative S-4

Replacement Alternative S-4 provides an alignment south of the existing East Span. The horizontal alignment has been developed to minimize the length of the new bridges by providing a tangent directed toward the Oakland Touchdown area. The three structure types under consideration can be used on Alternative S-4.

Alternative S-4 has been developed to avoid impacting the existing East Bay Municipal Utility District (EBMUD) outfall within San Francisco Bay. The overall length of Replacement Alternative S-4 is approximately 3591 meters (11,780 feet).

Design Variations for Replacement Alternatives

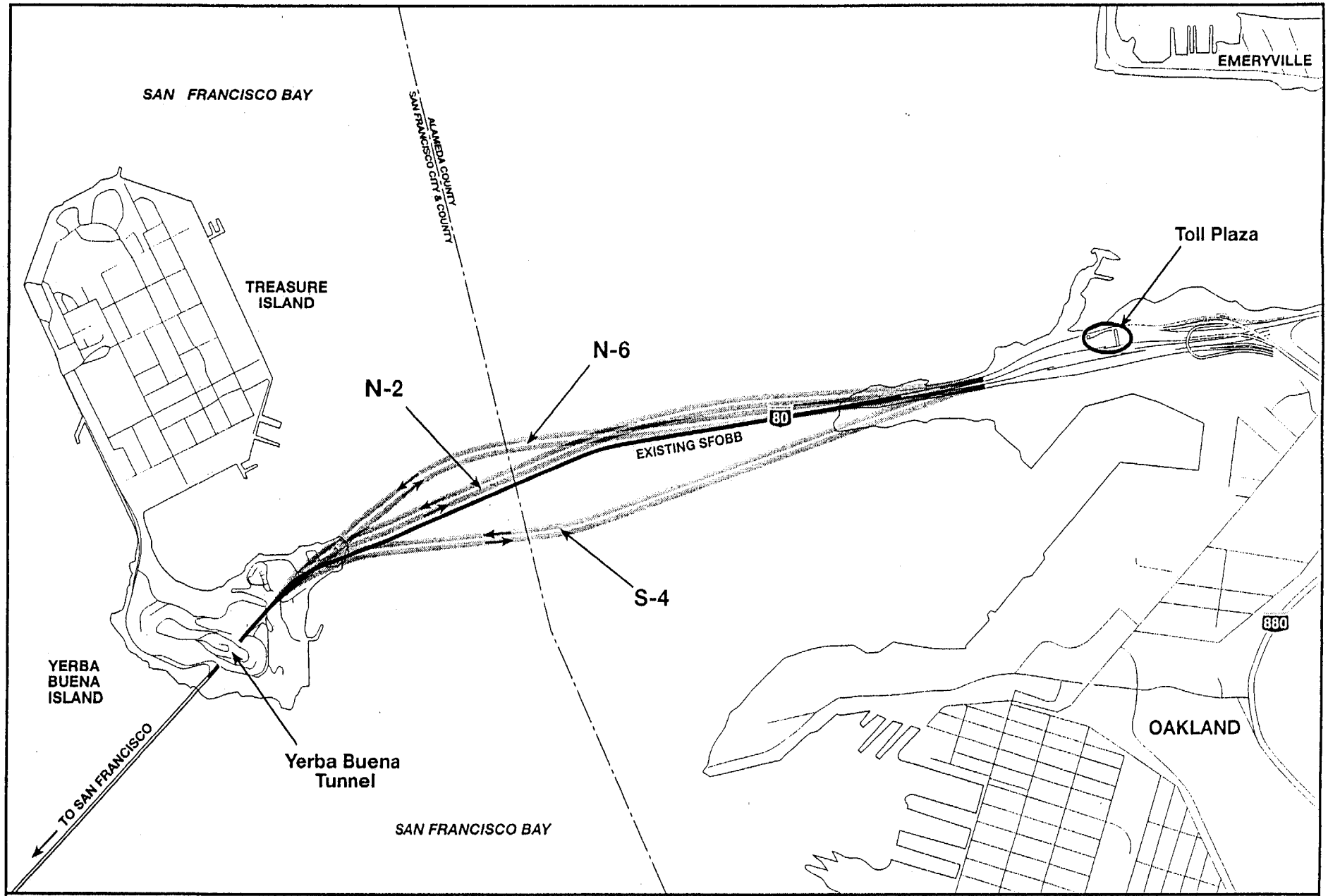
The proposed East Span Project replacement alternatives consist of two side-by-side bridge decks separated by 15 meters (50 feet). The typical section for each bridge deck consists of five lanes, each 3.6 meters (12 feet) wide, and left and right shoulders, each 3.0 meters (10 feet) wide. The overall width of each bridge deck is 25.07 meters (82 feet).

Replacement alternatives include a 4.7 meter (15.5 foot) pedestrian/bike path on the south side of the eastbound structure. The path would be .3 meters (1 foot) above the vehicular travel lanes.

Design variations have been identified for consideration with each of the replacement alternatives. The design variations are:

Span Types

- Single-tower cable-stayed bridge
- Single-tower self-anchored suspension bridge
- Skyway entire length



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:27,500

0 250 500 1000 m

PBQ&D F-231 7/28/98

Wetland Technical Assessment

A formal delineation of jurisdictional wetlands and waters was performed for the San Francisco-Oakland Bay Bridge East Span Project. This section presents the results of the wetland delineation and describes the waters of the United States.

Regulatory Overview

As discussed in Section 4, the U.S. Army Corps of Engineers (Corps) regulate the disposal of dredged and fill materials into "waters of the United States," including jurisdictional wetlands, under Section 404 of the federal Clean Water Act and Section 10 of the Rivers and Harbors Act. Waters of the U.S. include: waterways used for navigation or leading to navigable rivers, waters used in interstate commerce, including isolated wetlands and lakes, and wetlands bordering streams or other water bodies.

The Corps and EPA define wetlands as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions" (Environmental Laboratory 1987). The procedures to determine presence of wetlands are detailed in the *1987 Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987).

Methods

Potential jurisdictional wetlands were delineated in the field using methods outlined in the Corps' Wetland Delineation Manual (Environmental Laboratory 1987). Jurisdictional wetlands are defined when three conditions exist: (1) presence of hydric soils, (2) presence of ponded water during the growing season, and (3) presence of hydrophytic vegetation. The wetland status of dominant plants was determined using Reed (1988). Soil horizon colors were determined using the Munsell soil color charts. Hydrologic indicators were recorded on datasheet included in Appendix B.

Wetland boundaries and sample point locations were mapped in the field on 1:1,000 scale topographic maps of the project area. Area of wetlands and mudflats within the project study area was determined using a planimeter. These jurisdictional features are shown on the biological resource figures provided in Section 8.

Results

Wetland resources found in the project study area include "special aquatic sites" regulated by the Corps under Section 404 of the Clean Water Act and waters of the United States regulated under Section 10 of the Rivers and Harbors Act.

Special Aquatic Sites (Wetlands) - Section 404

Special aquatic sites in the project study area include wetlands, mudflats, and vegetated shallows (eelgrass beds). The biological resource figures in Section 8 show the location of jurisdictional wetlands and mudflats. The total area of jurisdictional wetlands in the project area is 0.06 hectare (0.15 acres). The total area of mudflats is 1.26 hectares (3 acres).

The project study area has three wetland sites. One wetland site is a narrow strip located along the high tide line of Radio Point Beach. Approximately 0.01 hectare (0.03 acre) of this wetland is within the project study area and another 0.01 hectare (0.03 acre) extends beyond the study area boundary to the northeast. Dominant plant species in this wetland are saltgrass (*Distichlis*

spicata) (FACW) and searocket (*Cakile maritima*) (FACW). Depth to free water was approximately 30 centimeters (12 inches) during high tide. Soils are stabilized and unstabilized beach and dune deposits. A muted-tidal wetland occurs behind the foredune area outside the project study area (wetland sample point B-1).

A second narrow band of tidal wetlands is located on the north side of Yerba Buena Island in the project study area. This wetland band extends for approximately 90 meters (295 feet) along the high tide line and is approximately 1 meter (3.28 feet) wide. Total wetland area is approximately 0.01 hectare (0.03 acre). Dominant plant species in this wetland area are pickleweed (*Salicornia virginica*) (OBL), saltgrass (*Distichlis spicata*) (FACW), and fat hen (*Atriplex triangularis*) (FACW). The substrate is coarse-textured sandy loam with many rocks and cobbles. This area is frequently saturated and inundated during high tides.

The third wetland site is a seasonal wetland located in a shallow topographic depression on the south side of the existing highway right-of-way adjacent to the Oakland Army Base property. The wetland area at this site is 0.03 hectare (0.07 acre). This site appears to have been recently used for construction staging and storage and it is likely that the topographic depression was created by these activities. Dominant plant species include rabbit-foot grass (*Polypogon monspeliensis*) (OBL), common knotweed (*Polygonum arenastrum*) (UPL), ryegrass (*Lolium perenne*) (FAC), fat hen (*Atriplex triangularis*) (FACW), and bristly ox-tongue (*Picris echioides*) (FAC). Soils in this area are characterized as a silty loam. The site contained 5-8 centimeters (2-3 inches) of standing water at the time of observation. Algal mats indicate that the site is frequently inundated or saturated during the winter. Runoff flows into the wetland from adjacent uplands and paved surfaces.

Mudflats occur along the north side of the Oakland Touchdown at the eastern bridge abutment and along the southeast side of Yerba Buena Island, east of the Coast Guard Station. Approximately 1.2 hectares (2.97 acres) of mudflats are located between Radio Point Beach and the eastern bridge abutment. An additional 0.06 hectare (0.15 acres) of mudflats are located along the beach east of the Coast Guard Station on Yerba Buena Island.

Special Aquatic Sites (Eelgrass Beds) - Section 404/10

Eelgrass beds are known to occur in shallow waters, less than 2 meters (6.56 feet), within the project study area (LTMS 1996). The extent of eelgrass beds that are present has not been determined; however, eelgrass was observed in shallow areas along the north side of the Oakland "touch down" area. These areas are important highly productive habitats for numerous species of fish including Pacific herring and are considered special aquatic sites under Section 404.

Waters of the United States - Section 404/10

Waters of the U.S. within the study area include "waters ...that are subject to the ebb and flow of the tide shoreward to the Mean High Water mark" and are used to transport interstate or foreign commerce, as described under Section 10 jurisdiction [33 Code of Federal Regulation Part 322.2]. The open waters within the study area are cold, saline, and low in total suspended sediment (LTMS 1996). The project area is bisected by a navigation channel that is under the jurisdiction of the U.S. Coast Guard. Section 10 jurisdiction extends to the mean high water mark on the north and south sides of the San Francisco-Oakland Bay Bridge. Section 404 jurisdiction extends to the high tide line on the north and south sides of the bridge.

The Bay Conservation and Development Commission (BCDC) has jurisdiction extending to all

areas of the Bay that are subject to tidal action including a 30.5-meter (100-foot) shoreline band surrounding the Bay from the Mean-High Water mark. For the SFOBB project, the area subject to BCDC jurisdiction includes the YBI and Oakland Touchdown area shoreline.

Functions and values

Wetland ecosystems possess unique functions and values that vary depending on the type of wetland, its size, surrounding land uses, and the degree to which it has been previously disturbed. Wetland functions are defined as the physical, chemical, and biological attributes of a wetland such as flood storage, species habitat, or groundwater discharge. Other functions of wetlands may have specific "values" that are considered beneficial to society such as groundwater recharge, recreation, or aesthetics.

Each wetland type was evaluated separately to determine general wetland functions and values. Categories of wetland functions and the evaluation criteria were based on the Wetland Evaluation Technique developed by the Corps for the Federal Highway Administration. The following standard functions were assessed for each wetland type:

Groundwater recharge

Groundwater discharge

Flood flow alteration

Sediment/toxicant retention

Nutrient removal/transformation

Production export

Wildlife diversity/abundance

Aquatic diversity/abundance

Uniqueness/heritage

Recreation

The level of detail required to evaluate functions and values of the wetlands was proportional to several key factors. These factors included wetland condition, whether the wetland was natural or artificial, commonness or rarity, presence or absence of sensitive species, size, magnitude of potential impacts, and regional status of wetlands.

Functions and values of the wetlands in the study corridor were evaluated based on field observations. This analysis is based on the assumption that the value and functions performed by the wetlands generally vary in relation to wetland types. Therefore two tidal wetland types are likely to have similar functions and values, but differ from the attributes of a non-tidal type. This is caused by the similarity of vegetation, soils, and hydrology within wetland types and the differences of these factors between types. Other factors that affect the functional assessment of wetland types are vegetative development of the wetland site, barriers between the wetland and adjoining uplands, and adjacent land uses.

The tidal wetlands present in the project study area possess a moderate level of functions and values since they are likely to be remnant wetlands existing among non-native species. These wetland areas do not provide extensive habitat for wildlife and therefore, are not considered to be

of high quality. The non-tidal wetland area posses very limited functions and values due to the lack of wetland species diversity and human disturbance. This wetland area is unlikely to provide habitat for wildlife species. The mudflat areas located on the Oakland Touchdown at the eastern bridge abutment and along the southeast side of Yerba Buena Island provide a high level of functions and values as foraging habitat for a variety of bird species.

References:

Environmental Laboratory. 1987. Corps of Engineers Wetland Delineation Manual. Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Hickman, J. (ed.). 1993. The Jepson Manual, Higher Plants of California. University of California Press, Berkeley, California.

Long-Term Management Strategy (LTMS) Multi-Agency Writing Team. April, 1996. Draft Long-Term Management strategy (LTMS) for the Placement of Dredged Material in the San Francisco Bay Region. Vol. I and II.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Bay Bridge / Radio Pt. Dunes
Applicant/Owner:
Investigator: Steve Leach Jennifer O'Connell

Date: 11/17/97
County: Alameda
State: CA

Do Normal Circumstances exist on the site? (Yes) No
Is the site significantly disturbed (Atypical Situation)? Yes (No)
Is the area a potential Problem Area? Yes (No)
(If needed, explain on reverse.)

Community ID:
Transect ID: A
Plot ID: A-1

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Distichlis spicata(d)	H	FACW
2. Cakile maritima	H	FACW
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: Plants are growing at or slightly above the high tide line ≈ 1.3 meters

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
X No Recorded Data Available

Field Observations:
Depth of Surface Water: Ø (in.)
Depth to Free Water in Pit: EST. 12-16 (in.) (during high tide)
Depth to Saturated Soil: EST. 8-12 (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
X Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
___ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks: High tide rack line is located approximately at saltgrass - bare sand bdy.

width of wetland zone is ≈ 1 meter by 90 feet (? meters)

SOILS

A-1

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
		10YR 4/2			

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Soil is stabilized beach and dune deposits with no discernable development such as streaking, reduction, or organic acc.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? Yes (No)

Is this Sampling Point Within a Wetland? (Circle) (Yes) No

Remarks: Hydric soil criteria waived due to the type of soil present (recently deposited sand).

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINA..ON
(1987 COE Wetlands Delineation Manual)

A-2

Project/Site: Bay Bridge / Radio Pt. Dunes	Date: 11/17/97
Applicant/Owner:	County:
Investigator:	State:
Do Normal Circumstances exist on the site? (Yes) No	Community ID:
Is the site significantly disturbed (Atypical Situation)? Yes (No)	Transect ID: A
Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Plot ID: A-2

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Carpobrotus edulis	H	UP	9.		
2. Distichlis spicata	H	FACW	10.		
3. Grindelia stricta angustifolia	S	FACW	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).

Remarks: Carpobrotus edulis and Distichlis spicata share in dominance. Grindelia dominant in immediate band where pit site is located. Many roots observed, depth 40 inches.

HYDROLOGY

___ Recorded Data (Describe in Remarks):
 ___ Stream, Lake, or Tide Gauge
 ___ Aerial Photographs
 ___ Other
X No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)

Depth to Free Water in Pit: >36 (in.)

Depth to Saturated Soil: 32 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
 ___ Inundated
 ___ Saturated in Upper 12 Inches
 ___ Water Marks
 ___ Drift Lines
 ___ Sediment Deposits
 ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
 ___ Oxidized Root Channels in Upper 12 Inches
 ___ Water-Stained Leaves
 ___ Local Soil Survey Data
 X FAC-Neutral Test
 ___ Other (Explain in Remarks)

Remarks: Site is located in a linear topographic depression.

Map Unit Name
(Series and Phase): ____________________ Drainage Class: ________

Field Observations
Confirm Mapped Type? Yes No

Taxonomy (Subgroup): ____________________

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Sandy soil. No hydric soil characteristics observed. Soil from a [illegible] recently deposited sand. Accumulation of organic material below 32 inches, near saturation.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? Yes (No)
Hydric Soils Present? Yes (No)

(Circle)
Is this Sampling Point Within a Wetland? Yes (No)

Remarks: No evidence of wetland hydrology.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Bay Bridge \ Radio Beach Dunes
Applicant/Owner:
Investigator:
Date: 11/17/97
County: Alameda
State: California

Do Normal Circumstances exist on the site? (Yes) No
Is the site significantly disturbed (Atypical Situation)? Yes (No)
Is the area a potential Problem Area? Yes (No)
(If needed, explain on reverse.)

Community ID:
Transect ID: B
Plot ID: B-1

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Grindelia stricta angustifolia	C	FACW
2. Distichlis spicata	H	FACW
3. Convolvulus soldanella	H	UP
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)
Depth to Free Water in Pit: 18 (in.)
Depth to Saturated Soil: 11 (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
X Saturated in Upper 12 Inches
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
___ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks:

SOILS

B-1

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-20	A/B	2.5Y 4/2	—	—	Sandy
20+	B	5Y 3/1	—	—	Sandy

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- X Reducing Conditions (Brad)
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Recently deposited soils with no A/B horizon. Hydric soil characteristics are not developed in upper soil horizon.

WETLAND DETERMINATION

Hydrophyte Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? Yes (No)

Is this Sampling Point Within a Wetland? (Circle) (Yes) No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Bar Bridge \ Parker Branch Drive Date: 11/17/97
Applicant/Owner: _____ County: _____
Investigator: _____ State: _____

Do Normal Circumstances exist on the site? (Yes) No
Is the site significantly disturbed (Atypical Situation)? Yes (No)
Is the area a potential Problem Area? Yes (No)
(If needed, explain on reverse.)

Community ID: _____
Transect ID: B
Plot ID: B-2

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Carex radiata	H	UP
2. Dichanthelium dichotomum	H	FACW
3. Carex blanda	H	FAC
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
X No Recorded Data Available

Field Observations:

Depth of Surface Water: _____ (in.)
Depth to Free Water in Pit: 24 (in.)
Depth to Saturated Soil: 14 (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
X FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks:

SOILS

B-2

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations
Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-20	A/B	2.5Y4/3	—	—	sand
20+	B	2.5Y3/1	—	—	sand

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:
A/B Recent alluvial deposits of sand

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? Yes (No)
Hydric Soils Present? Yes (No)

(Circle)
Is this Sampling Point Within a Wetland? Yes (No)

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Bair Bridge / Urban Breeze — Date: 1/17/97
Applicant/Owner: — County:
Investigator: — State:

Do Normal Circumstances exist on the site? (Yes) No
Is the site significantly disturbed (Atypical Situation)? Yes (No)
Is the area a potential Problem Area? Yes (No)
(If needed, explain on reverse.)

Community ID:
Transect ID: C
Plot ID: C-1

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Salicornia virginica	H	OBL
2. Distichlis spicata	H	FACW
3. Atriplex triangularis	H	FACW
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).

Remarks: Small band of wetland vegetation adjacent to rocky shoreline.

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
X No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)
Depth to Free Water in Pit: >12 (in.)
Depth to Saturated Soil: >12 (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
X Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
___ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks:

SOILS C-1

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations
Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-5	A	10YR 3/1	—	—	sandy - loam
>5	B				sandy - gravel

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
X Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Circle) (Yes) No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Burl Bridge / Oakland Farms Site — Date: 11/17/97
Applicant/Owner: Oakland Farms Site — County:
Investigator: — State:

Do Normal Circumstances exist on the site? (Yes) No
Is the site significantly disturbed (Atypical Situation)? Yes (No)
Is the area a potential Problem Area? Yes (No)
(If needed, explain on reverse.)

Community ID:
Transect ID: D
Plot ID: D-1

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Polygonum sagittatum	(H)	OBL
2. Polygonum amphibium	(H)	OBL
3. Atriplex triangularis	(H)	FACW
4. Iodium [illegible]	(H)	FAC
5. Pontia Echinodes	(H)	FAC
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
X No Recorded Data Available

Field Observations:

Depth of Surface Water: 2-3 (in.)
Depth to Free Water in Pit: ___ (in.)
Depth to Saturated Soil: @ surface (in.)

Wetland Hydrology Indicators:
Primary Indicators:
X Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
___ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks:

SOILS

D-1

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations
Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0	A/B	2.5Y 3/2	—	—	silty-loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes)	No	(Circle)
Wetland Hydrology Present?	(Yes)	No	
Hydric Soils Present?	(Yes)	No	

Is this Sampling Point Within a Wetland? (Yes) No (Circle)

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION

Project/Site: SFOBB-East Span Radio Beach Applicant/Owner: _____ Investigator: _____	Date: 7-17-98 County: Alameda State: California
Do Normal Circumstances exist on the site? Yes (No) Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? (Yes) No (If needed, explain on reverse.)	Community ID: _____ Transect ID: E Plot ID: E-1

• Wetland area located adjacent to asphalt road. Dense vegetation used and wetland area became inundated.

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Salicornia virginica		OBL
2. Distichlis spicata		FACW
3. Grindelia		FACW
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): _____

Remarks: Sedimentation caused by tidal influences is enough to allow for plant growth. Dominance of vertical stems

HYDROLOGY

- ___ Recorded Data (Describe in Remarks):
  - ___ Stream, Lake, or Tide Gauge
  - ___ Aerial Photographs
  - ___ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	0	(in.)
Depth to Free Water in Pit:	20	(in.)
Depth to Saturated Soil:	12	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- X Drift Lines
- X Sediment Deposits
- X Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: Distinct drift lines indicate area is inundated for a long period of time.

E-1

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-5	A	10YR 4/2	---	---	Sandy-Silt

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Yes) No (Circle)

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION

Project/Site: SFOBB - East Span Radio Beach Applicant/Owner: _____ Investigator: _____	Date: 7-17-98 County: Alameda State: California
Do Normal Circumstances exist on the site? Yes No Is the site significantly disturbed (Atypical Situation)? Yes No Is the area a potential Problem Area? Yes No (If needed, explain on reverse.)	Community ID: _____ Transect ID: E Plot ID: E-2

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Carpobrotus edulis (a)		UP	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). _____

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

X No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)

Depth to Free Water in Pit: — (in.)

Depth to Saturated Soil: — (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

E-2

(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations Confirm Mapped Type? Yes No

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
	B	10YR 4/3	—	—	Silty sand

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes (No) (Circle)
Wetland Hydrology Present? Yes (No)
Hydric Soils Present? Yes (No)

Is the Sampling Point Within a Wetland? (Circle) Yes (No)

Remarks:

APPENDIX D

CONCEPTUAL MITIGATION PLAN

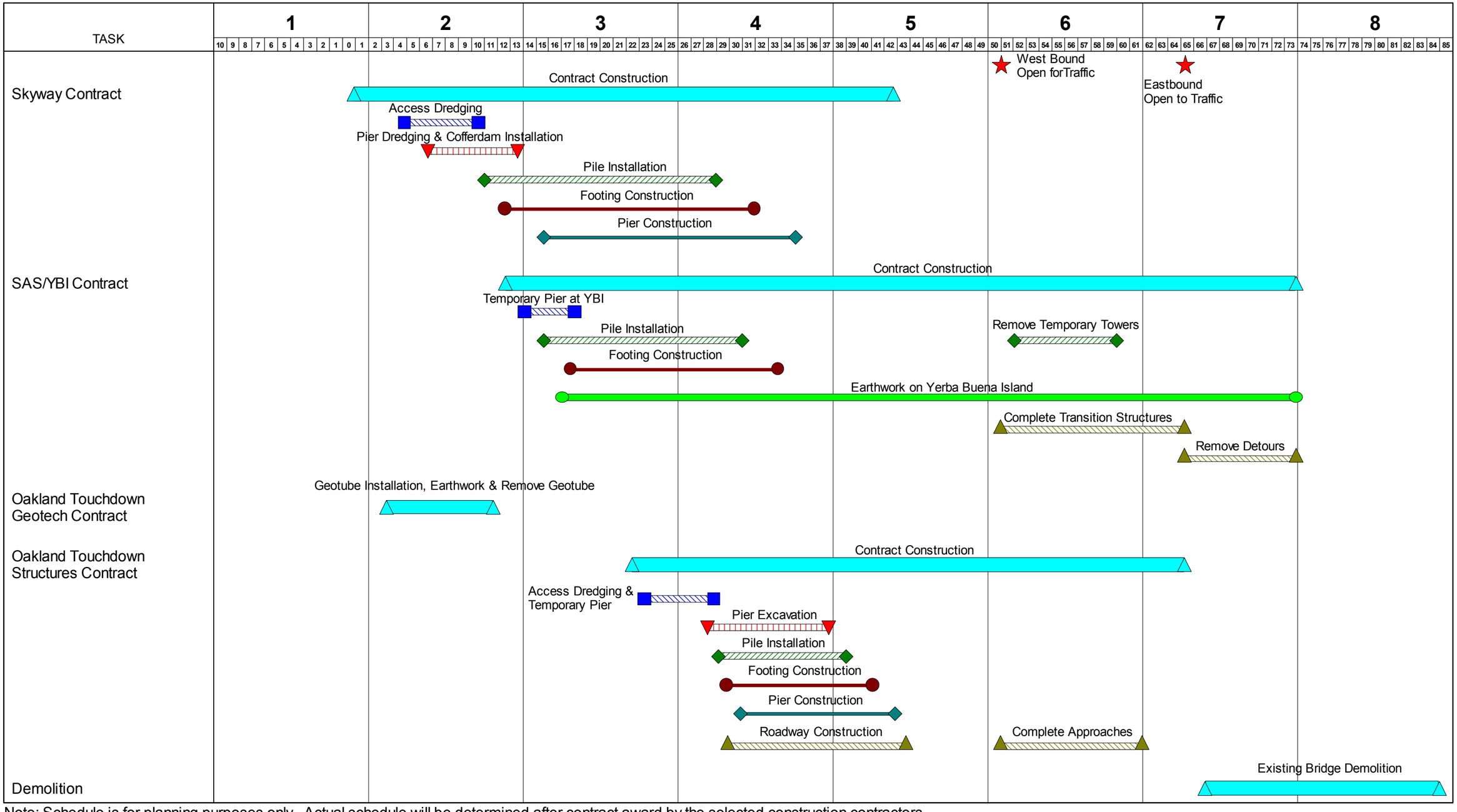
APPENDIX E

PROJECT SCHEDULE

SFOBB - East Span Seismic Safety Project

Construction Milestones

7/20/01



Note: Schedule is for planning purposes only. Actual schedule will be determined after contract award by the selected construction contractors.

APPENDIX F

SUMMARY OF PROJECT ENVIRONMENTAL IMPACTS

Table S-3 Summary of Impacts and Mitigations-Build Alternatives

Community

Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Employment	**The estimated total number of human employment years is projected to be 4,290.**	**The estimated total number of human employment years is projected to be 4,232.**	**Same as N-2**	**The estimated total number of human employment years is projected to be 2,356.**
Community Services	**No impact**	**No impact**	**Due to insufficient clearance between the bridge structure and EBMUD's existing service road, EBMUD's service trucks would be prevented from accessing its dechlorination facility at the west end of the Oakland Touchdown requiring relocation of the service road and/or the dechlorination facility. The road could be relocated to the north, south, via a tunnel or on an overpass. The dechlorination facility could be moved to the east. Potential impacts of relocation are reduced visual public access to the Bay for westbound motorists approaching the bridge if an overpass is constructed, fill in the Bay (approximately 13,650 cubic meters (18,000 cubic yards) and 0.36 hectare (0.9 acre), drainage problems, and/or modifications to the design and/or operation of EBMUD's discharge system. All relocation options entail increased construction and maintenance costs.** Mitigation- **Caltrans would work with EBMUD to relocate the service road and/or the dechlorination facility to maintain EBMUD's operations. Caltrans would obtain necessary permits/permit amendments, fund relocation costs, and implement any necessary mitigation. Caltrans would assure continual operation of EBMUD's discharge system during relocation.**	**No impact**

Existing Land Use				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Former Navy Building 213 on YBI	**Would displace Building 213 (which currently serves as storage for one fire truck) on YBI.** Mitigation-**If requested by the Navy, Caltrans will replace Building 213 with a structure of like size, construction materials and quality, built to current building codes. The Navy would need to provide a suitable site for the replacement of Building 213 outside State right-of-way.**	**Same as N-6**	**No impact**	**No impact on Navy buildings.**
USCG Buildings on YBI	**Would displace buildings 30 (storage), 40 (administration), 75 (vacant), and 270 (vacant). Mitigation-**Caltrans would provide replacement buildings of like size, construction materials and quality, built to current building codes. The USCG would need to provide suitable sites for the replacements outside State right-of-way.	**Same as N-6**	**Same as N-6**	**No impacts to USCG buildings.**
Land Use on USCG YBI facility	**No permanent impact on USCG usable land area.**	**Same as N-6**	**Footing and support columns of new bridge would span approximately 1.5 hectares (3.8 acres) of 2 hectares (5 acres) of USCG usable land area. USCG land under bridge could be developed subject to review and approval by Caltrans.**	**Same as N-6**
Land Use at the Oakland Touchdown Area	**Would require permanent displacement of 0.2-hectare (0.5- acre) of the City of Oakland-designated Resource Conservation Area north of the existing bridge. New upland/aquatic interface areas would be improved on-site for wildlife.**	**Same as N-6**	**See Community Services impacts of Replacement Alternative S-4.**	**No impact**

Section 4(f) Evaluation

Section 4(f) of the Department of Transportation Act of 1966 specifies that "[t] he Secretary [of Transportation] may approve a transportation program or project…. requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of a historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, area, refuge or site) only if 1) there is no prudent and feasible alternative to using that land; and 2) the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use." Permanent 4(f) uses are summarized below; temporary 4(f) uses are discussed on page S-38.

Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Use of Resources Protected by Section 4(f) of the Department of Transportation Act	**Removal of existing East Span of SFOBB.** Mitigation-**Caltrans would comply with the Memorandum of Agreement executed pursuant to the National Historic Preservation Act (see Appendix O).**	**Same as N-6**	**Removal of existing East Span of SFOBB and occupation of about 3.0 hectares (7.4 acres) of the 5.9-hectare (14.7-acre) proposed Gateway Park.** Mitigation-**For the loss of the bridge, Caltrans would comply with the Memorandum of Agreement executed pursuant to the National Historic Preservation Act. To minimize harm to the proposed park, Caltrans would replace public shoreline access for loss of proposed parkland.**	**Substantial modifications to the existing East Span of SFOBB.** **On YBI, enlarged column would incorporate about 0.001-hectare (0.002-acre) of the grounds of the Senior Officers' Quarters Historic District.** Mitigation-**Caltrans would comply with the Memorandum of Agreement executed pursuant to the National Historic Preservation Act.**

Development Trends

Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Treasure Island Draft Reuse Plan Consistency The CCSF has a conceptual proposal under the 1996 Treasure Island Draft Reuse Plan to develop commercial and residential properties on the east side of YBI. The Draft Plan was prepared for the Office of Military Base Conversion, Planning Development, City and County of San Francisco, and the San Francisco Redevelopment Agency.	**Bridge would span 1.1 hectares (2.9 acres) of 3.2 hectares (7.8 acres) of developable land. Air space under bridge could be leased for development by the CCSF per review and approval by Caltrans. The number of live/work units and the size of the conference center would be reduced due to location of bridge footings. Proposed development would require Bay Plan amendments and a federal consistency determination from the Bay Conservation and Development Commission (BCDC) pursuant to the Coastal Zone Management Act. N-6 is consistent with the transportation element of the CCSF reuse plan.**	**Same as N-6**	**Bridge would span 0.6-hectare (1.4 acres) of 3.7 hectares (9.1 acres) of developable land; approximately 0.8-hectare (2.0 acres) of land occupied by existing span would become available for development. Otherwise, same as N-6.**	**No permanent impacts on the CCSF's redevelopment concepts described in the 1996 Treasure Island Draft Reuse Plan. Bridge would continue to span 0.2-hectare (0.6-acre) of 3.2 hectares (7.8 acres) of developable land.**

Development Trends (continued)				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Port of Oakland BCDC amended its Seaport Plan and Bay Plan in January 2001, which included the deletion of the port priority use area at the Bay Bridge Site (Oakland Touchdown area).	**No permanent impact on the Port of Oakland expansion plans.**	**Same as N-6**	**Same as N-6**	**Same as N-6**
Oakland Touchdown Area Proposed Gateway Park Reuse plan of Oakland Base Reuse Authority (OBRA) has designated 5.9 hectares (14.7 acres) at the Oakland Touchdown area as a future public park. Led by East Bay Regional Park District, park planning agencies include the City of Oakland, National Park Service, Port of Oakland and BCDC.	**Would not involve use of the proposed Gateway Park. At the closest point, the bridge structure would be approximately 46 meters (151 feet) from the OBRA-designated park boundary.**	**Same as N-6**	**The structure would bisect and occupy 3.0 hectares (7.4 acres) of 5.9 hectares (14.7 acres) from the OBRA-designated park.**	**Would not involve use of proposed Gateway Park. At the closest point, the bridge structure would be approximately 30 meters (98 feet) from the OBRA-designated park boundary.**
BDCD Permit 11-93 As part of the I-880/Cypress Freeway Replacement Project, Caltrans is required to provide public access to the Bay at the Oakland Touchdown area. These access areas, or overlooks, and other improvements are required by BCDC to maximize public access to the west end of the Oakland Touchdown area.	**Consistent with Permit 11-93 as amended. Pursuant to the amended permit, the final location and design of public access improvements would be jointly planned in coordination with the East Span Project subject to BCDC approval. Should it prove infeasible to construct some or all of the improvements required under Permit 11-93, Caltrans may pay BCDC an in-lieu fee.**	**Same as N-6**	**Same as N-6**	**Same as N-6**

Transportation				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Vehicular Transportation	**Would retain five eastbound and five westbound traffic lanes on the East Span. No long-term impacts to local traffic, transit, or maritime traffic. Addition of shoulders may reduce non-recurrent congestion caused by accidents or stalls and would result in fewer lane closures for maintenance operations.** **The existing Caltrans maintenance road at the Oakland Touchdown area would be realigned but there would be no loss of access.**	**Same as N-6**	**Same as N-6; however S-4 would require modification of existing access patterns on the local roadways of the Oakland Touchdown area. Realigned access roadways would serve existing facilities and future park development, with the exception of the EBMUD dechlorination facility where restricted access would require relocation of the service road and/or dechlorination facility. (Mitigation for this impact is discussed in the Community Services section on page S-22).**	**Traffic operations would remain the same as under existing conditions.**
Non-Motorized Traffic: Bicycles and Pedestrians	**Provision of bicycle/pedestrian path between Oakland and YBI would be consistent with the CCSF's Treasure Island Draft Reuse Plan, BCDC's Bay Plan, City of Oakland's Pedestrian and Bicycle Master Plan and Association of Bay Area Government's Bay Trail Plan.**	**Same as N-6**	**Same as N-6**	**Would not implement a bicycle/pedestrian path on East Span and is therefore inconsistent with local plans listed under N-6.**
Parking on YBI and the Oakland Touchdown area	**No impact**	**No impact**	**No impact**	**No impact**
Marine Traffic	**No impact**	**No impact**	**No impact**	**No impact**
Air Traffic	**Would change existing obstruction markings and lighting.** **Federal Administration (FAA) form 7460-1, "Notice of Proposed Construction or Alteration," would be filed with the FAA, which would disclose the location and height of a cable-supported tower. Warning lights are required because the tower would exceed 61 meters (200 feet), which is FAA's maximum height for which warning lights are not required.**	**Same as N-6**	**Same as N-6**	**No impact**

Visual

Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Removal of Vegetation and Slope Disturbance on Yerba Buena Island and the Oakland Touchdown Area	The appearance of the hillside to the south of the East Span may be permanently altered, and approximately 350 mature trees (mostly eucalyptus) on eastern facing slopes of YBI and 71 mature trees (mostly pine) at the Oakland Touchdown area would be removed. **Mitigation-**Caltrans would approve a construction access plan detailing grading, access roads, vegetation removal, and location of equipment platforms. Construction limits on YBI would protect select vegetation and screening to the maximum extent feasible. A re-vegetation plan would include the planting of mature trees, monitoring, and replanting as necessary to return disturbed acres to a natural appearance and to establish visual screening of the bridge. Re-planted vegetation would require approximately ten years to reestablish itself to current density. Caltrans would develop a master-planting plan in coordination with local agencies to be implemented within two years after bridge construction is completed.	Same as N-6	Construction would result in removal of approximately 325 mature trees at YBI (mostly eucalyptus) and approximately 12 mature trees at the Oakland Touchdown area (mostly pine). **Mitigation-**Same as N-6	Construction would result in removal of approximately 150 mature trees at YBI (mostly eucalyptus). **Mitigation-**Same as N-6
Visual Image Types	For the main span, the self-anchored design variation would result in the most favorable impact upon visual quality regardless of viewpoint location due to an increase in the vividness of the span and overall unity of the view. The skyway design variation would result in the least favorable impact upon visual quality due to a reduction in the vividness and intactness of the span.	Same as N-6	Same as N-6	Would have a negligible impact on visual quality from distant viewpoints, as the structural elements added to the East Span would not be perceptible. For some of the closer viewpoints, the Retrofit Alternative would have a minimally adverse impact on viewers, as the additional structural elements (new piers and strengthened existing piers) would obstruct views underneath the bridge.

Air Quality				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Permanent Air Quality Impacts	**No impact. Project would not increase roadway capacity.**	**Same as N-6**	**Same as N-6**	**Same as N-6**

Noise and Vibration				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Noise	**On YBI, future predicted peak noise levels at certain locations would exceed FHWA Noise Abatement Criteria (NAC), but would generally decrease by 1 to 14 dBA compared to the existing noise levels. At the Oakland Touchdown area, future users of the proposed Gateway Park could experience slightly higher noise levels (increases of 1-2 dBA) in the eastern portion of the park. Increases of less than 3 dBA are generally not perceptible. Noise levels at the western end of the park would be 3 to 6 dBA lower than existing noise levels.**	**Same as N-6.**	**On YBI, peak noise levels at certain locations would exceed FHWA NAC, but would decrease by 1 to 14 dBA compared to the existing noise levels. At the Oakland Touchdown area, future users of the proposed Gateway Park could experience slightly higher noise levels (increases of 2 to 3 dBA) in the eastern portion of the park. These increases should not be perceptible. Noise levels at certain locations in the western end of the park cannot be quantified using the noise model because the bridge would be directly over the area, but the bridge deck would likely shield the area from traffic noise on the structure above.**	**No change from existing noise levels.**
Noise on the bike/pedestrian path	Future predicted noise on the path would be approximately 82-84 dBA. Exposure to typical noise levels on the bridge would not cause hearing problems for path users.	Same as N-6	Same as N-6	Retrofit Alternative would not include a bicycle/pedestrian facility.

Noise and Vibration (continued)				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Vibration	Vibration levels from traffic operations (i.e. heavy-truck traffic) would probably be below the levels of human perception at distances of more than 30 meters (100 feet) from bridge support columns. Vibration levels at nearby locations, including the film studios on TI, are predicted to remain below architectural damage criterion and human perception levels.	Same as N-6	Same as N-6	Same as N-6; however vibration levels may be slightly than those resulting from replacement alternatives because this alternative would not include use of higher-mass concrete on bridge decks.

Hazardous Waste Sites				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Hazardous Waste Sites and Materials	**May impact eight hazardous waste sites on YBI and three on the Oakland Touchdown area.** Mitigation-**Off-site disposal would be at an appropriate landfill or recycling facility. Licensed waste haulers would transport hazardous soil.**	**Same as N-6** Mitigation-**Same as N-6**	**May impact nine hazardous waste sites on YBI and four on the Oakland Touchdown area.** Mitigation-**Same as N-6**	**May impact five hazardous waste sites on YBI and two on the Oakland Touchdown area.** Mitigation-**Same as N-6**

Geology, Soils and Seismicity				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Soil and Rock Stability Settlement	Pre-existing slope stability and erosion problems on YBI adjacent to the USCG facility. An incident of slope failure could interfere with USCG operations by obstructing the USCG road next to the facility. In addition, a temporary road would be required through an existing slope approximately 35 meters (115 feet) south of Building 206 and Quarters 8. **Mitigation-** Caltrans would ensure that the project does not exacerbate pre-existing problems within Caltrans' right-of-way or its temporary construction easement during or after construction. Consultation with the USCG and collection of information on slope stability prior to and during construction would be conducted. Caltrans will require the contractor to prepare a conceptual plan for slope stability and erosion control on the hillside above the USCG facility and solicit comments on the plan from the USCG. In order to minimize slope impacts associated with the temporary road, temporary retaining walls would be used. Excavation required for construction of the walls would be filled in. At the Oakland Touchdown area, the potential for liquefaction of the fill that lies beneath the water table exists. **Mitigation-**At-grade approach structures would be created by placing embankment fill on certain sections of the landfall that may be prone to settlement.	Same as N-6	Same as N-6	No impact

Geology, Soils and Seismicity (continued)				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Seismicity	Meets lifeline criteria. Expected to withstand an MCE on the San Andreas or Hayward fault. Design criteria include non-collapse and serviceability of structures when subjected to ground motions during a seismic event.	Same as N-6	Same as N-6	Does not meet lifeline criteria. It is expected that the retrofitted main span would withstand an MCE or smaller event however it is anticipated that in the event of an MCE, the retrofitted East Span would experience damage to truss members in the steel superstructure.
Tsunamis	The structural design on the Oakland Touchdown area would include the capability of resisting water/wave/current-induced loading.	Same as N-6	Same as N-6	Same as N-6

Water Quality				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Water Quality	**Not expected to increase concentration levels of pollutants commonly found in highway runoff nor is the design expected to elevate the levels of less common constituents. A reduction in sandblasting and painting operations and use of non-lead based paint on steel portions of the new span would decrease discharge of lead debris and residue into the Bay. Addition of shoulders would improve response time for emergency vehicles, maintenance crews and hazardous spills response teams, minimizing discharges into the Bay. No impacts to ground water quality.**	**Same as N-6**	**Same as N-6**	**No impact. The current practice of sweeping the bridge decks would continue and storm water would continue to discharge directly into the Bay.**

Permanent Change in Volume and Area of Other Waters of the U.S. as defined by ACOE

Under the Clean Water Act, the ACOE considers fill in Other Waters of the U.S. to be solid material placed in jurisdictional waters below the Mean High Water Line (MHW), which is approximately +1.42 meters National Geodetic Vertical Datum (NGVD) (+4.63 feet) at Yerba Buena Island and the Oakland touchdown area. The analysis of fill in Other Waters of the U.S. does not include fill in special aquatic sites. Impacts to special aquatic sites are addressed separately.

Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Change in Volume to Other Waters of the U.S.	**Would result in a net increase of 386,000 cubic meters (504,900 cubic yards).**	**Same as N-6**	**Would result in a net increase of 368,300 cubic meters (481,700 cubic yards).**	**Would result in a net decrease of 26,300 cubic meters (34,200 cubic yards).**
Change in Surface Area to Others Waters of the U.S.	**Would result in a net decrease of 0.26 hectare (0.63 acre).**	**Same as N-6**	**Would result in a net decrease of 0.93 hectare (2.31 acre).**	**Would result in a net decrease of 1.70 hectare (4.19 acre).**

Permanent Change in Volume and Area of San Francisco Bay as defined by BCDC

Under the McAteer-Petris Act, BCDC considers Bay fill to be any solid, pile-supported, floating, cantilevered or high-level suspended material that is placed bayward of the Mean High Tide Line (MHTL) which is approximately +0.82 meters NGVD (+2.68 feet) at Yerba Buena Island and +0.84 meters NGVD (+2.77 feet) at the Oakland Touchdown area. Unlike the ACOE, the analysis of fill under BCDC's jurisdiction includes fill in special aquatic sites such as wetlands, eelgrass beds and sand flats.

Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Change in Volume of the Bay	**Would result in a net increase of 352,400 cubic meters (460,900 cubic yards).**	**Same as N-6**	**Would result in a net increase of 367,500 cubic meters (480,600 cubic yards).**	**Would result in a net decrease of 16,500 cubic meters (21,300 cubic yards).**
Change in Surface Area of the Bay	**Would result in a net decrease of 13.96 hectares (34.51 acres).**	**Would result in a net decrease of 13.03 hectares (32.40 acres).**	**Would result in a net decrease of 12.30 hectares (30.40 acres).**	**N/A**

Special Aquatic Sites

Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Sand flats The sand flats located within the project area are along the north side of the Oakland Touchdown area and along the southeast side of Yerba Buena Island, east of the U.S. Coast Guard facility. Their functions are feeding, and roosting habitat for a variety of shorebirds.	**Permanent impacts to 1.36 hectares (3.36 acres) at the Oakland Touchdown area.** Mitigation-**On-site restoration of a portion of sand flats following construction; off-site creation of tidal marsh ecosystem.**	**Same as N-6**	**Permanent impacts to 0.01 hectare (0.03-acre) at YBI.** Mitigation-**Off-site creation of tidal marsh ecosystem.**	**No impact**

Special Aquatic Sites (continued)				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Eelgrass Beds Five areas of eelgrass beds have been identified in the project area. There are two on the north shore of YBI, two on the south shore of YBI and one on the north shore of the Oakland Touchdown area. Their functions are food source, nursery, spawning ground, and/or habitat for resident and migratory species of birds, fish, and invertebrates.	**Permanent impacts to 0.21-hectare (0.52 acre) at the Oakland Touchdown area and 0.01-hectare (0.03 acre) at YBI.** Mitigation-**Minimization of impacts through a turbidity control program; harvesting eelgrass from the barge access channel and replanting in adjacent beds as a pilot program; restoring bathymetry of portions of barge access channel and replanting with eelgrass to facilitate eelgrass colonization; off-site creation of tidal marsh ecosystem.**	**Same as N-6**	**Permanent impacts to 0.16-hectare (0.40-acre) at YBI.** Mitigation-**Minimization of impacts through a turbidity control program; harvesting eelgrass from the barge access channel at YBI and replanting it in adjacent beds as a pilot program; restoring bathymetry of portions of barge access channel and replanting with eelgrass to facilitate eelgrass colonization; off-site creation of tidal marsh ecosystem.**	**No impacts**
Wetlands The tidal wetlands in the project study area possess a moderate level of functions and values since they are remnant wetlands surrounded by non-native species that do not provide extensive habitat for wildlife. The two non-tidal wetlands in the project area possess very limited functions and values due to the lack of wetland species diversity and human disturbance.	**No impact** **Avoidance of habitat by marking the wetlands as Environmentally Sensitive Areas (ESAs)**	**Same as N-6**	**Permanent impacts to 0.05-hectare (0.12-acre) of non-tidal wetlands on the south side of the Oakland Touchdown area from construction.** Mitigation-**Off-site creation of non-tidal wetlands.**	**Same as N-6**

Special Status Species				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Double-Crested Cormorant **Protected by Migratory Bird Treaty Act.**	Dismantling the existing structure would remove nesting sites. **Mitigation-**Nesting habitat would be constructed on the new bridge.	Same as N-6	Same as N-6	No impact
Peregrine Falcon **Removed from Federal Endangered Species List. Protected by State Endangered Species Act and Migratory Bird Treaty Act.**	Dismantling the existing structure would remove nesting site. **Mitigation-**None required: peregrine falcon is likely to nest on a replacement bridge. Santa Cruz Predatory Bird Research Group would continue monitoring and off-site release efforts to avoid potential impacts during scheduled maintenance activities.	Same as N-6	Same as N-6	No impact

Other Natural Communities				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Shorebird Habitat	**Would result in a small loss of sand flats that provide shorebird foraging and roosting habitat on the north side of the Oakland Touchdown area. However, due to the small area impacted, it is not anticipated that this will adversely impact shorebirds.** Mitigation-**See construction period mitigation.**	**Same as N-6**	**Would result in a small loss of upland area on the south side of the Oakland Touchdown area that is known to provide roosting habitat for shorebirds during the winter months.** Mitigation-**See construction period mitigation.**	**No impact**
Coast Live Oak Woodlands	**Would result in the loss of six coast live oak trees on YBI.** Mitigation-**Replacement of trees per the CCSF tree ordinance at a 3:1 ratio. Due to the root structure of mature oak trees, the replacement trees may be smaller than those displaced.**	**Same as N-6**	**Same as N-6**	**No impact**

Historic Properties

In accordance with Section 106 of the National Historic Preservation Act, measures to mitigate project effects on historic properties have been stipulated in a Memorandum of Agreement (MOA) among the Federal Highway Administration (FHWA), U.S. Coast Guard, the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP), with Caltrans as a concurring party. The Navy, local governments, and Native Americans were also asked to participate in the development of mitigation measures and invited to sign the MOA as concurring parties. Mitigation measures for the impacts below are identified in the MOA (Appendix O). The following discussion includes permanent and construction-period impacts.

Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Archaeological Site CA-SFr-04/H on YBI	**Columns for eastbound and westbound permanent structures and one column for the westbound temporary detour would disturb site.**	**No impact**	**North half of site removed due to westbound temporary detours.** Mitigation-**Same as N-6**	**Excavation to strengthen Column YB3 would disturb site.** Mitigation-**Same as N-6**
Building 262 (Torpedo Building)	**Impact due to "visual, audible, or atmospheric elements that are out of character with the property." In addition, construction activities in the vicinity and overhead could result in inadvertent damage.**	**Same as N-6**	**No impact**	**No impact**
Senior Officers' Quarters Historic District (includes Quarters 1 to 7 and Buildings 83, 205, and 230).	**Views from Quarters 1 would be slightly modified by placement of a concrete column and removal of existing steel column. Footings for temporary detours would be constructed within the district. The affected areas would be restored to their prior condition at the completion of the project.**	**Same as N-6**	**Would not modify the views from Quarters 1, otherwise same as N-6.**	**The encasement of steel columns in concrete at Piers YB2 through YB4 would introduce a visual intrusion.**
Quarters 8, 9, 10 and Building 267 (garage associated with Building 10).	**No impact**	**Same as N-6**	**Same as N-6**	**Same as N-6**
Existing East Span of SFOBB	**Removal of bridge and two ancillary buildings (Caltrans garage and electric substation on YBI).**	**Same as N-6**	**Same as N-6**	**Alteration of bridge.**
Key Pier Substation (Oakland Touchdown area)	**Removal of existing East Span, to which substation contributes; station itself not removed or altered, but its historic association with the SFOBB would be lost.**	**Same as N-6**	**Same as N-6**	**No impact**

Scientific Resources

Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Scientific Resources	Potential for disturbance of paleontologic resources during in-Bay construction of new piers and footings. **Mitigation-**Should paleontological resources be discovered, Caltrans would ensure that the provisions of the California Public Resources Code Section 5097.6 are implemented using their "Interim Guidance for the Identification, Assessment, and Treatment of Paleontological Resources," July 1991.	Same as N-6	Same as N-6	Potential for disturbance of paleontologic resources during in-Bay construction to retrofit existing piers and footings. **Mitigation-**Same as N-6

Utilities

Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Impacts to Utilities	Utilities on the existing East Span would be relocated to the replacement span. Caltrans or the utility owner will pay relocation costs depending on agreements made prior to relocation. Submarine utilities would be avoided to the greatest extent possible. If utilities cannot be avoided, they would be protected in place or relocated. Caltrans and the contractor would assume responsibility for damage and payment for documented income loss and difference in power costs. A temporary span of the land portion of the EBMUD outfall facility may be required and would be coordinated with EBMUD.	Same as N-6	Same as N-6; however a special bridge design would be required to sufficiently span the outfall facility in order to prevent construction period damage.	Utilities on the existing East Span would be maintained. Otherwise, same as N-6.

Energy				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Energy	**No long-term impacts.**	**Same as N-6**	**Same as N-6**	**Same as N-6**

Construction Period Impacts

The following are construction period impacts which would occur during construction of a replacement or retrofit alternative. These impacts are temporary and are not anticipated to have environmental impacts beyond completion of the project.

Construction Period Community Impacts				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Community Impacts	**The desirability of Quarters 1-7 would be reduced during construction due to noise, lighting, and visual impacts of construction. Building 262, currently vacant and in disrepair, would be accessible but would not be usable due to adjacent construction activity.** Mitigation-**Caltrans would reimburse the CCSF for documented losses in rental income from Quarters 1- 7. A pre- and post-construction survey of Quarters 1- 7 and Building 262 would be conducted and construction-related damage would be repaired as necessary. Protective measures would be developed in consultation with property owners.**	**Same as N-6**	**Same as N-6**	**Same as N-6; however, causes for motorist delays on YBI and the Oakland Touchdown would be limited to the use of local streets for transport of workers, equipment, and materials.**

Construction Period Community Impacts (continued)				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Safety and Security	**Heavy vehicle movements, possible hazardous waste excavation and transport, and construction site activity could create safety concerns for construction workers and members of the public on YBI and the Oakland Touchdown.** Mitigation-**Best construction management practices would be in place to ensure the safety of construction workers, local employees, and residents during construction.**	**Same as N-6**	**Same as N-6**	**Same as N-6**
Temporary use of Resources Protected by Section 4(f) of the Department of Transportation Act	**On YBI, four to six column footings of a temporary detour would be placed in landscaped or paved areas of the Officers' Quarters Historic District.** Mitigation-**Caltrans would protect historic buildings in the senior Officers' Quarters Historic District during construction and restore disturbed areas following construction.**	**Same as N-6**	**Same as N-6**	**No impact**

Construction Period Transportation Impacts				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Impacts to traffic on the East Span	Lane or bridge closures would be necessary to connect the new structure and the existing viaduct at YBI. These closures could result in some traffic delays on the East Span and its approaches. Additional delays could occur as "rubbernecking" drivers watch construction of the new superstructure and dismantling of the existing bridge from the new bridge. **Mitigation-** Caltrans is continuing to investigate lane and bridge closures in an effort to simultaneously minimize public inconvenience, facilitate construction and maximize public safety. Closures would be timed during off-peak hours to the extent feasible and Caltrans would implement a traffic management plan to manage impacts to traffic.	Same as N-6	Same as N-6	Would result in longer and more frequent lane closures (i.e., almost every day during the construction period), compared to the replacement alternatives. **Mitigation-**Same as N-6

Construction Period Transportation Impacts (continued)				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Impacts to Traffic Circulation on YBI	**Occasional congestion could occur on YBI due to construction-related vehicle traffic on local roadways, an increase in the volume of vehicles entering and exiting the island, closure of westbound on-ramp and eastbound off-ramp on the east side of the island, closure of Southgate Road, and modifications to the USCG access road, Macalla Road, and the road that provides access to Building 262. Also, there would be no public access to the parade grounds and a temporary restriction of access to Building 267 (the garage at Quarters 10), for about a day.** Mitigation-**The contractor would construct a detour around the column foundations to keep Macalla Road open or provide another travel way for USCG personnel and column construction could be staged so that entrances to the USCG Station would be open at all times. Temporary detours would be constructed and flaggers employed to ensure motorist safety for USCG vehicles in the construction zone. Barges would deliver wide and oversized construction loads, where possible. Caltrans would limit contractor parking to the temporary construction easement.**	**Same as N-6**	**Same as N-6**	**Same as N-6; however, would not restrict access to Building 267.**
Impacts to pedestrian circulation on YBI	**Would displace stairway linking USCG facility with bus stop on SFOBB.** Mitigation-**Caltrans would construct new stairway after consulting with USCG, Navy, and the CCSF about appropriate site. Construction-period shuttle service would be provided.**	**Same as N-6**	**No long-term impact on stairway linking USCG facility with bus stop on SFOBB. Stairway would be closed during construction.** Mitigation-**Construction-period shuttle service would be provided.**	**Construction may require the temporary closure of stairway linking USCG facility with the bus stop on SFOBB.** Mitigation-**Construction-period shuttle service would be provided in the event of a closure.**

Construction Period Transportation Impacts (continued)				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Impacts to Traffic Circulation on the Oakland Touchdown area	Would require closure of access road on north side of I-80, eliminating shoreline access for authorized vehicles west of Radio Point Beach. Construction-related vehicle traffic could potentially cause minor delays to other traffic and two AC Transit lines. No mitigation is recommended for potential minor delays.	Same as N-6	Same as N-6; however, would not require closure of shoreline access road used by authorized vehicles.	Same as S-4
Marine Operations	Non-project-related marine traffic would be diverted from areas of construction. Barges, other construction vessels, and falsework would restrict the navigation opening. Temporary closures of portions of the navigation opening could occur. **Mitigation-**Caltrans would consult with the USCG to implement a vessel warning system for periods when construction vessels are placed in the water within the bridge construction zone. Notification to mariners and other requirements will be specified in the permit completed for the USCG.			

Construction Period Visual Impacts				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Visual Impacts on YBI	**Visual changes for residents and users of YBI due to location of temporary detour columns, construction staging, lighting equipment and the reduction of some Bay views from Quarters 1-7. Changes would not substantially alter the character of the Bay or YBI.** Mitigation-**To reduce glare from lighting used during nighttime construction activities, Caltrans would require contractor to direct lighting onto the immediate area under construction only and avoid shining lights toward residences and marine traffic.**	**Same as N-6**	**Same as N-6**	Same as N-6, including possible visual impacts from the use of scaffoldings.
Visual Impacts on the Oakland Touchdown area	**Visual changes due to construction activities and staging.**	**Same as N-6**	**Same as N-6**	Same as N-6

Construction Period Air Quality Impacts				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Air Quality Impacts	**Would contribute to area air pollutants emissions during most stages of construction. The largest sources of anticipated pollutants would be dust generated by excavation, grading, and other ground disturbing activities on YBI and the Oakland Touchdown area and exhaust emissions from equipment and marine vessels. Because emissions would vary from day to day depending on construction activity, construction location, and distance to receptors, an exact estimate of total construction emissions and impacts are not possible.** **Measures to reduce emissions during construction, as specified in Caltrans' Standard Specifications, would be included in the contract specifications. These measures include: watering exposed soil surfaces, covering trucks transporting dust producing material, reducing-construction vehicle travel speeds on unpaved surfaces, maintaining equipment per manufacturers' specifications and conforming to all air pollution regulations. Because these measures will be included in the contractor specifications, no mitigation is proposed.**	**Same as N-6**	**Same as N-6**	Same as N-6

Construction Period Noise and Vibration Impacts				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Noise Impacts	**During construction of the temporary eastbound detour, noise levels at Bachelor Enlisted Quarters may increase by ten dBA over existing conditions. During pile driving operations, noise levels at Quarters 8, the Bachelor Enlisted Quarters Building 240, and Building 262 may increase by 19-20 BA and 7 dBA at the Treasure Island film studios.** Construction-period Noise Abatement-**All construction equipment would conform to provisions in Section 7-1.01I of the latest edition of Standard Specifications. The contractor would be required to comply with local noise control ordinances to the extent practicable. Caltrans would continue to consult with the Coast Guard to identify and implement feasible and reasonable measures to reduce construction-related noise levels at USCG facilities. In addition, Caltrans is continuing to investigate the possibility of limiting the hours for pile driving to reduce the construction noise impacts to other residents of YBI and TI.**	**Same as N-6**	**Same as N-6**	**During rivet removal operations, noise levels at USCG Building 40 (administration) and Navy Building 213 (storage for 1 fire truck) may increase by 3-16 dBA over existing conditions. Pile driving would occur in closest proximity to Quarters 1 and noise levels at that location might increase by 24 dBA.** Construction-period Noise Abatement-**Same as N-6.**
Traffic Noise from temporary detours associated with Replacement Alternatives	**Noise generated by detour traffic is anticipated to be similar to noise from existing traffic. Slight increases of 1-2 dBA at certain locations would generally not be perceptible.**	**Same as N-6**	**Same as N-6**	**No detours structures required.**

Construction Period Noise and Vibration Impacts (continued)				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Vibration Impacts	**Due to distance of buildings from construction activities, no architectural damage is expected to occur as a result of vibrations. Due to distance from construction activities, vibrations should not be perceptible at the Treasure Island film studios.** Abatement- **Historic properties on YBI would be monitored for construction related damage including the use of vibration measuring devices on buildings. Caltrans would photographically document the condition of these buildings prior to the start of construction to establish the baseline condition. Any damage to the buildings resulting from construction activities would be repaired in accordance with the Secretary of the Interior's Standards for Rehabilitation.**	**Same as N-6**	**Same as N-6**	**Same as N-6**

Construction Period Hazardous Material Impacts				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Hazardous Wastes and Materials	**Construction workers or public may be exposed to contaminated soil, groundwater, lead-based paint and asbestos during grading, excavation, and dismantling of existing bridge.** Mitigation- **Construction and dismantling of all structures would include procedures for the identification, abatement, handling, and disposal of contaminated materials, as well as worker health and safety. All procedures would be consistent with Caltrans' guidelines and all federal, state and local laws and regulations.**	**Same as N-6**	**Same as N-6**	Same as N-6

Construction Period Impacts to Water Resources and Water Quality				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Water Quality	**Potential impacts from construction activities include but are not limited to: groundwater contamination from excavations; surface water impacts from dredging and dewatering, concrete placement and washout activities, management and application of chemical products; construction activities performed on barges; use of floating batch plants; and accidental spills from construction equipment and materials.** Mitigation-**A Storm Water Pollution Prevention Program (SWPPP) would be prepared to identify pollutant sources that may affect the quality of the discharges of storm water associated with the construction activities of the project and to identify and implement storm water pollution control measures to reduce pollutants in storm water discharges. The objectives of the SWPPP would be to minimize the degradation of off-site receiving waters to the maximum extent practicable with the current Best Management Practices (BMPs) for the construction industry and to reduce the mass loading of chemicals and suspended solids to the downstream drainage system and the receiving water bodies.**	**Same as N-6**	**Same as N-6**	**Same as N-6; however, because the existing structure would not be dismantled, a separate SWPPP for dismantling would not be required.**

Temporary Change in the Volume and Area of Other Waters of the U.S. as Defined by ACOE

Under the Clean Water Act, the ACOE considers fill in Other Waters of the U.S. to be solid material placed in jurisdictional waters below the Mean High Water Line (MHWL), which is approximately +1.42 meters NGVD (+4.63 feet) at Yerba Buena Island and the Oakland touchdown area. The analysis of fill in Other Waters of the U.S. does not include fill in special aquatic sites. Impacts to special aquatic sites are addressed separately.

Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Change in Volume to Other Waters of the U.S.	**Would result in a net decrease of 41,000 cubic meters (54,000 cubic yards).**	**Same as N-6**	**Would result in a net decrease of 45,000 cubic meters (58,000 cubic yards).**	**Would result in a net decrease of 13,000 cubic meters (17,000 cubic yards).**
Change in Surface Area to Others Waters of the U.S.	**Would result in a net decrease of 0.80 hectare (1.97 acre).**	**Same as N-6**	**Would result in a net decrease of 1.05 hectare (2.59 acre).**	**Would result in a net decrease of 0.36 hectare (0.90 acre).**

Temporary Change in the Volume and Area of San Francisco Bay as defined by BCDC

Under the McAteer-Petris Act, BCDC considers Bay fill to be any solid, pile-supported, floating, cantilevered or high-level suspended material that is placed bayward of the Mean High Tide Line (MHTL) which is approximately +0.82 meters NGVD (+2.68 feet) at Yerba Buena Island and +0.84 meters NGVD (+2.77 feet) at the Oakland Touchdown area. Unlike the ACOE, the analysis of fill under BCDC's jurisdiction includes fill in special aquatic sites such as wetlands, eelgrass beds and sand flats.

Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Change in Volume of the Bay	**Would result in a net increase of 48,000 cubic meters (63,000 cubic yards).**	**Same as N-6**	**Would result in a net increase of 42,000 cubic meters (54,000 cubic yards).**	**Would result in a net decrease of 12,000 cubic meters (15,000 cubic yards).**
Change in Surface Area of the Bay	**Would result in a net decrease of 7.12 hectares (17.6 acres).**	**Would result in a net decrease of 7.07 hectares (17.48 acres).**	**Would result in a net decrease of 6.25 hectares (15.44 acres).**	**Would result in a net decrease of 0.05 hectares and (0.13 acres).**

Construction Period Impacts to Special Aquatic Sites

Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Sand flats The sand flats located within the project area occur along the north side of the Oakland Touchdown area and along the southeast side of Yerba Buena Island, east of the U.S. Coast Guard facility. Their functions are foraging and roosting habitat for a variety of shorebirds.	**Placement of a geotube for dewatering would impact approximately 0.69 hectare (1.70 acres) of sand flats along the north shore of the Oakland Touchdown area, resulting in a small reduction in roosting and feeding habitat for shorebirds.** Mitigation-**On-site restoration of portions of sand flats following construction; off-site creation of tidal marsh ecosystem would include enhancement or creation of upland refugia for shorebirds.**	**Same as N-6**	**Trestles would temporarily impact 0.01 hectare (0.02 acre) along the south shore of YBI.** Mitigation-**Same as N-6**	**No impact**

Construction Period Impacts to Special Aquatic Sites (continued)

Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Eelgrass Beds Five areas of eelgrass beds have been identified. There are two on the north shore of YBI, two on the south shore of YBI and one on the north shore of the Oakland Touchdown area. Their functions are food source, nursery, spawning ground, and/or habitat for resident and migratory species of birds, fish, and invertebrates.	**Temporary impacts to 0.01 hectare (0.02 acre) of eelgrass at the Oakland Touchdown area from turbidity associated with dredging, pile driving, and barge maneuvering.** Mitigation-**Would include utilization of dredge types and techniques that minimize turbidity and implementation of a turbidity control program; marking eelgrass beds outside access channel as Environmentally Sensitive Areas (ESAs); harvesting eelgrass from within the barge access channel and replanting in adjacent beds as a pilot program; restoring bathymetry of portions of barge access channel and replanting with eelgrass to facilitate eelgrass colonization; off-site creation of tidal marsh ecosystem.**	**Same as N-6**	**Same as N-6**	**No impact**
Wetlands The tidal wetlands in the project study area are located along the north shore of the Oakland Touchdown area and the north side of Yerba Buena Island. These wetlands possess a moderate level of functions and values. The two non-tidal wetlands on the south side of the Oakland Touchdown area possess very limited functions and values due to the lack of wetland species diversity and human disturbance.	**Caltrans would avoid potential construction period impacts to the tidal wetlands at the Oakland Touchdown area and Yerba Buena Island and the two isolated non-tidal wetlands at the Oakland Touchdown area by designating them as Environmentally Sensitive Areas (ESAs).**	**Same as N-6**	**Tidal wetlands at YBI would be marked as ESA's. No construction-period impacts to non-tidal wetlands at the Oakland Touchdown. For permanent impacts, see page S-33.** Mitigation-**Off-site creation of non-tidal wetlands.**	**Same as N-6**

Construction Period Impacts to Wildlife

Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Peregrine falcon **Removed from Federal Endangered Species List. Protected by State Endangered Species Act and Migratory Bird Treaty Act.** **Mitigation would apply even though the falcon has been delisted.**	Construction activities could impact breeding and nesting. **Mitigation-**The Santa Cruz Predatory Bird Research Group would monitor the birds during their nesting period and if they show signs of disturbance during construction or dismantling operations, the eggs and/or chicks would be collected, raised off-site and eventually released at a natural site such as Point Reyes.	Same as N-6	Same as N-6	Same as N-6
Double-Crested cormorant and the Western Gull **Protected by Migratory Bird Treaty Act.**	If cormorants or gulls nest within construction work areas, nests could be disturbed during construction. **Mitigation-**Caltrans would prevent nesting on the new span during construction.	Same as N-6	Same as N-6	Same as N-6
Black-crowned Night Heron, Allen's hummingbird, white-tailed kite, bank swallow, and Bewick's wren	Vegetation and tree removal on YBI may impact nesting on YBI. **Mitigation-**Prior to the removal of vegetation and trees, a biological monitor would survey for nests. Vegetation and trees with nests or those adjacent to areas with nests would not be removed until the nesting is complete or to the extent feasible, vegetation and trees that need to be removed could be removed prior to the nesting season.	Same as N-6	Same as N-6	Same as N-6
Shorebirds	Construction period impacts to sand flats would cause a reduction in roosting and feeding habitat for shorebirds. In addition, a small portion of upland roosting habitat located on the south side of the Oakland Touchdown area would be temporarily displaced for use as a construction staging area. **Mitigation-**See mitigation for construction period impacts to sand flats.	Same as N-6	Same as N-6	A small portion of upland roosting habitat located on the south side of the Oakland Touchdown area would be temporarily displaced for use as a construction staging area. **Mitigation-**Same as N-6.

Construction Period Impacts to Wildlife (continued)				
Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
California sea lion and harbor seal **California sea lions and harbor seals are protected from harassment under the Federal Marine Mammal Protection Act.**	Noise from pile driving may disturb harbor seals and sea lions when they are foraging in the area. Marine mammals swimming in the project vicinity would be temporarily displaced if they chose to avoid the area. **Mitigation-**Appropriate mitigation would be developed as necessary in coordination with National Marine Fisheries Service (NMFS) such as establishing a safety zone around pile driving activities and sound attenuation during pile driving.	Same as N-6	Same as N-6	Same as N-6
Gray Whale	Noise from the pile driving activity may disturb or impact the behavior of gray whales passing through the project vicinity. It is likely that whales will avoid the pile driving area during the 3-month period in which they are observed in the Bay. **Mitigation-** See mitigation for California sea lion and harbor seal.	Same as N-6	Same as N-6	Same as N-6
Chinook salmon, Steelhead, Green sturgeon, and Longfin smelt **Steelhead are threatened under the Federal Endangered Species Act. Green sturgeon and longfin smelt are state and federal species of concern. Winter-run Chinook salmon are endangered at federal and state level. Spring-run is listed as federally proposed endangered. Fall-run is listed as proposed threatened at the federal level.**	Potential increased turbidity and resuspended contaminants in water column due to dredging, pile driving, barge maneuvering, and trestle and cofferdam construction. Increased amounts of sediment in water could lower dissolved oxygen levels and adversely affect oxygen uptake by fish. **Mitigation-** Implementation of a turbidity control program. If construction sequencing permits, dredging would be avoided in shallow water during the peak juvenile out migration period (January 1 through May 31).	Same as N-6	Same as N-6	Same as N-6

Construction Period Impacts to Cultural Resources

Discussed under permanent impacts to Cultural Resources identified earlier in the table.

Construction Period Excavation and Dredging

The Dredged Material Management Office (DMMO) approved the Sampling and Analysis Plan (SAP) and the Sediment Sampling and Analysis Report (SAR). The purpose of the plan and report was to collect and analyze sediment samples from new pier locations and access dredging necessary for Replacement Alternative N-6. Additional sediment characterization may be required by the DMMO if an alternative other than Replacement Alternative N-6 is selected. For all replacement alternatives, the sediments in the barge access channel for dismantling the existing bridge would need to be characterized in the future. The Dredged Material Management Plan describes reuse/disposal of materials and can be found in Appendix M. The determination of the DMMO concerning reuse/disposal sites is discussed in Section 4.14.10-Construction Excavation and Dredging.

Impact Category	Replacement Alternative N-6	Replacement Alternative N-2	Replacement Alternative S-4	Retrofit Existing Structure Alternative
Estimated Dredged Quantities	**Total estimated volume is 413,000 cubic meters (540,000 cubic yards).**	**Same as N-6**	**Total estimated volume is 417, 000 cubic meters (545,000 cubic yards).**	**Total estimated volume is 116,000 cubic meters (152,000 cubic yards).**

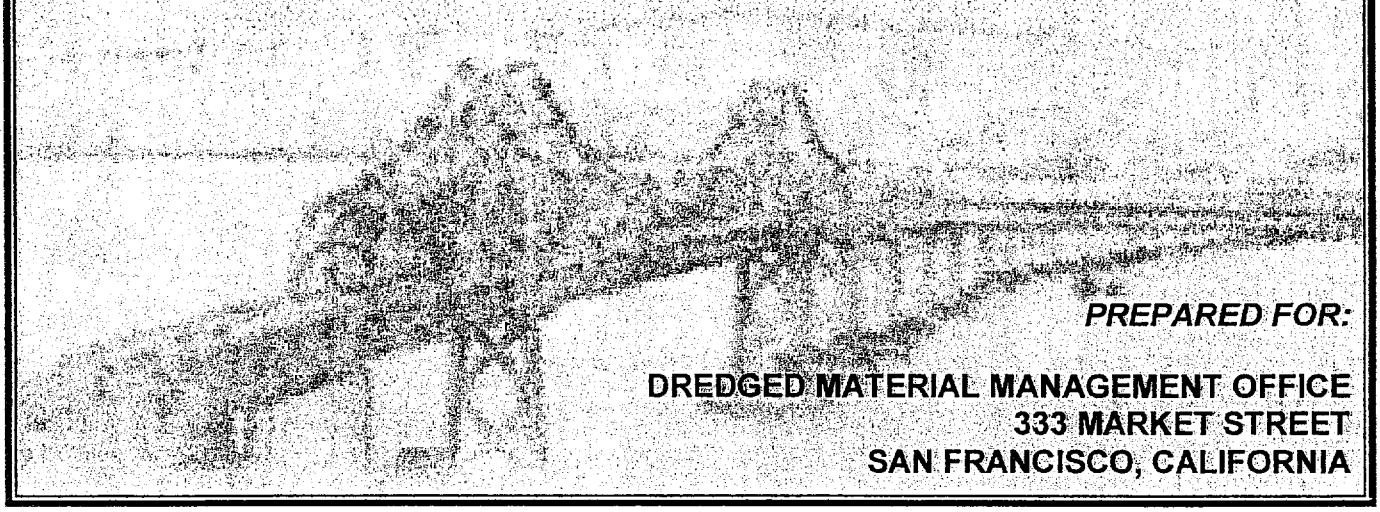
APPENDIX G

SEDIMENT SAMPLING AND ANALYSIS REPORT
EXECUTIVE SUMMARY

SEDIMENT SAMPLING AND ANALYSIS REPORT

San Francisco-Oakland Bay Bridge
East Span Seismic Safety Project
Alameda and San Francisco Counties, California

Volume 1 of 2



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EA 012000
04-SF-80 KP 12.2/KP 14.3
04-ALA-80 KP 0.0/KP 2.1

JUNE 2000

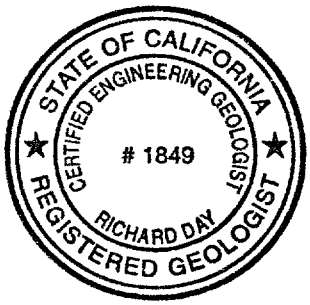
REPORT LIMITATIONS

This report has been prepared in accordance with generally accepted practices using standards of care and diligence normally practiced by recognized consulting firms performing services of a similar nature. This report presents our professional judgment based upon data and findings identified in this report and the interpretation of such data based on our experience and background, and no warranty, either expressed or implied, is made. The conclusions presented are based on the current regulatory climate and may require revision if future regulatory changes occur.

The findings identified in this report are predicated on the results of the limited sampling and laboratory testing performed. This report does not address impacts related to sources other than those specified herein.

The contents of this report reflect the views of Geocon Consultants, Inc., who is responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the State of California or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

GEOCON CONSULTANTS, INC.



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EXECUTIVE SUMMARY

This report presents the results of the sediment investigation performed by the California Department of Transportation (Caltrans), Division of Toll Bridge Program, Environmental Engineering Branch and Geocon Consultants, Inc. (Geocon) for the San Francisco-Oakland Bay Bridge (SFOBB) East Span Seismic Safety Project (East Span Project). This project is one of several that Caltrans is undertaking to address the overall need to provide a lifeline vehicular connection between the cities of San Francisco and Oakland. The East Span Project is needed because the existing span is not expected to withstand the ground motions from an earthquake with a 1,500-year return period on either the San Andreas Fault or Hayward Fault.

Five alternatives (the No-Build, Retrofit Existing Structure Alternative, and Replacement Alternatives N-2, N-6, and S-4) are being considered for the East Span Project. Replacement Alternatives N-2 and N-6 are north of the existing SFOBB while Replacement Alternative S-4 is south of the existing bridge. To evaluate the five project alternatives, Caltrans and the Federal Highway Administration (FHWA) prepared and circulated a National Environmental Policy Act (NEPA) Draft Environmental Impact Statement (DEIS)/California Environmental Quality Act (CEQA) Statutory Exemption. The Final Environmental Impact Statement (EIS) will recommend the preferred alternative, identify the Least Environmentally Damaging Practicable Alternative (LEDPA) pursuant to Section 404(b)(1) of the Federal Clean Water Act (FCWA), describe impacts and mitigation commitments, and provide a written response to all comments received during the public comment period.

Caltrans, at the request of U.S. Environmental Protection Agency (EPA), prepared a Dredged Material Management Plan (DMMP) providing information on the reuse/disposal of dredged materials from the East Span Project. Impacts and reuse/disposal options addressed in the DMMP would be similar for the build alternatives (S4, N2, and N-6), although total dredge quantities would be less for the Retrofit Existing Structure Alternative. Caltrans has identified Replacement Alternative N-6 as the preferred alternative, and Replacement Alternative N-6 was used in the DMMP to characterize the potential impacts of dredging and disposal of dredged material.

The scope of work for this investigation was to collect and analyze sediment samples from the locations of the new piers and from the construction access dredging area. A DMMO-approved Sampling and Analysis Plan (SAP) to characterize sediments for the Replacement Alternative N-6 alignment was developed through Dredged Material Management Office (DMMO) review and comment. Caltrans understands that additional sediment characterization may be required by DMMO if an alternative other than Replacement Alternative N-6 is built.

The multi-agency DMMO seeks to foster a comprehensive and consolidated approach to handling dredged material management issues. Agency members include:

- U.S. Army Corps of Engineers (COE)
- U.S. Environmental Protection Agency (EPA)
- San Francisco Bay Conservation and Development Commission (BCDC)
- San Francisco Bay Regional Water Quality Control Board (RWQCB)
- California State Lands Commission (SLC)

The California Department of Fish and Game provides advice and expertise to the DMMO. Although the DMMO issues a recommendation to their member agencies regarding preferred dredged material management options, the individual regulatory agencies must still issue specific regulatory approvals. Permits and certifications issued by these regulatory agencies are applicable to the East Span Project.

The purpose of the investigation is to provide DMMO with sufficient physical, chemical, and biological data to establish that the dredged sediment will not cause adverse effects to marine biota when disposed of at the sites under consideration. The disposal sites under consideration in the DMMP include Alcatraz Dredge Material Disposal Site (SF-11), San Francisco Deep Ocean Disposal Site (SF-DODS), Upland Wetland Reuse (UWR) sites, and other upland disposal sites.

For purposes of the East Span Project, there are four main construction activities that involve the dredging of sediment: 1) new pier construction; 2) new construction access channel dredging; 3) dismantling access channel dredging; and 4) dismantling the existing bridge. This investigation and report address only those sediments to be dredged during new pier construction and new construction access dredging. It was not appropriate at the time of this investigation to sample those sediments that will be dredged during dismantling due to the extended period of time between the construction and dismantling activities, Prior to the dismantling project, Caltrans will return to the DMMO with a plan to characterize those sediments that will be dredged for existing bridge dismantling and dismantling access channel dredging.

The estimated maximum combined volume of sediment from the two new construction activities totals 319,203 cubic meters (m^3) [417,502 cubic yards (yd^3)]. The majority of sediment will be generated during access channel dredging for construction activities at the beginning of the project. A detailed description of the dredging activities is provided in the DMMP.

The sediments encountered during the investigation were primarily silt and clay. Elevated levels of total polynuclear aromatic hydrocarbons (PAHs) [5,840 micrograms per liter (µg/L)] were detected at site SFOBB-N-1. Although some metals were detected in site sediments at levels exceeding San Francisco Estuary ambient concentrations, the majority of organic and inorganic analyte concentrations in site sediments were similar to concentrations detected in reference sediments.

Liquid/suspended phase (L/SP) bioassays using *Strongylocentrotus purpuratus/Lytechinus pictus*, *Mysidopsis bahia*, and *Citharichthys stigmaeus* were performed to evaluate the effect of site sediments on water column organisms in comparison with applicable reference site sediments. The L/SP bioassay results are summarized in Table ES-1 and do not preclude any site sediments from disposal at SF-11, SF-DODS, or UWR sites.

Solid phase bioassays using *Ampelisca abdita* and *Nephtys caecoides* were performed to evaluate the effect of site sediments on benthic organisms in comparison with applicable reference sediments. The results of the solid phase bioassays are summarized in Table ES-2. The results of the *Nephtys* solid phase bioassays indicate that sediments from sites SFOBB-N-2, SFOBB-N-5, and Access-N-5 are not suitable for disposal at SF-11, SF-DODS, or UWR sites.

Bioaccumulation testing was performed using *Macoma nasuta* and *Nephtys caecoides* to evaluate site sediment with SF-DODS reference sediment. The results of the bioaccumulation testing are summarized in Table ES-3. PAH bioaccumulation was observed in *Macoma* and *Nephtys* from SFOBB-N-1 sediments, precluding this site from disposal at SF-DODS. PAH bioaccumulation was also observed in *Macoma* from SFOBB-N-7 sediments, precluding this site from disposal at SF-DODS. Bioaccumulation observed in either species at all other sites is not considered sufficient to restrict disposal of these site sediments at SF-DODS.

The analysis of sediment suitability for disposal at SF-11, SF-DODS, and UWR sites is summarized in Table ES-4. Based on the physical, chemical, and biological testing and analyses, the following sediment volumes are suitable for disposal at the sites under consideration:

- up to 248,236 m^3 (324,680 yd^3) of site sediments are suitable for disposal at SF-11
- up to 244,512 m^3 (319,810 yd^3) of site sediments are suitable for disposal at SF-DODS
- up to 251,453 m^3 (328,888 yd^3) of site sediments are suitable for reuse at UWR sites

TABLE ES-1
EXECUTIVE SUMMARY OF LIQUID/SUSPENDED PHASE BIOASSAY RESULTS
San Francisco-Oakland Bay Bridge
New East Span Alignment

Sample ID	*Strongylocentrotus purpuratus*		*Lytechinus pictus*	Comments
SF-DODS Reference	>100	>100		
Alcatraz Reference	>100	>100		
Tubbs Island Reference			>100	
Paradise Cove Reference			>100	
SFOBB-N-1	>100			
SFOBB-N-2	>100			
SFOBB-N-3	>100			
SFOBB-N-4	>100			
SFOBB-N-5	17.8			Factored LC50/EC50 is higher than projected concentration
SFOBB-N-6	24.7			Factored LC50/EC50 is higher than projected concentration
SFOBB-N-7	30.2			Factored LC50/EC50 is higher than projected concentration
ACCESS-N-1		>100		
ACCESS-N-2		83.4		Factored LC50/EC50 is higher than projected concentration
ACCESS-N-3		>100		
ACCESS-N-4		56		Factored LC50/EC50 is higher than projected concentration
ACCESS-N-5		69.5		Factored LC50/EC50 is higher than projected concentration

Notes: Lower of LC50 or EC50 value shown above.
Above values shown in percent elutriate concentration.

Test Date:	7/8/99-7/12/99	7/15/99-7/19/99	8/14/99-8/18/99
CONTROL (% Survival)	100	93.9	95.7
Test Ref Tox (µg/L)	4.9	5.2	5.3
Lab Mean ±2SD (µg/L)	6.53±2.57	6.53±2.57	6.53±2.57
Acceptable ?	Yes	Yes	Yes

TAb__ ES-1

EXECUTIVE SUMMARY OF LIQUID/SUSPENDED PHASE BIOASSAY RESULTS

San Francisco-Oakland Bay Bridge
New East Span Alignment

Sample ID	*Mysidopsis bahia*		*Citharichthys stigmaeus*	
SF-DODS Reference	>100	>100		>100
SFOBB-N-1	>100		>100	
SFOBB-N-2	>100		>100	
SFOBB-N-3	>100		>100	
SFOBB-N-4	>100		>100	
SFOBB-N-5	>100		>100	
SFOBB-N-6	>100		>100	
SFOBB-N-7		>100	>100	
ACCESS-N-1		>100		>100
ACCESS-N-2		>100		>100
ACCESS-N-3		>100		>100
ACCESS-N-4		>100		>100
ACCESS-N-5		>100		>100

Notes: Lower of LC50 or EC50 value shown above.
Above values shown in percent elutriate concentration.

Test Date:	6/22/99-6/26/99	7/13/99-7/17/99	7/9/99-7/13/99	7/16/99-7/20/99
CONTROL (% Survival)	92	92	96	92
Test Ref Tox (µg/L)	16.7	14.1	4.4	4.4
Lab Mean ±2SD (µg/L)	13.62±9.1	13.62±9.1	4.1±0.68	4.1±0.68
Acceptable ?	Yes	Yes	Yes	Yes

TABLE ES-2
EXECUTIVE SUMMARY OF SOLID PHASE BIOASSAY RESULTS
San Francisco-Oakland Bay Bridge
New East Span Alignment

Sample ID	*Ampelisca abdita*	*Nephtys caecoides*	
SF-DODS Reference	86	92	
Alcatraz Reference	92	90	
Tubbs Island Reference	89		84
Paradise Cove Reference	91		98
SFOBB-N-1	85	96	
SFOBB-N-2	84	66	
SFOBB-N-3	97	86	
SFOBB-N-4	96	84	
SFOBB-N-5	98	70	
SFOBB-N-6	91	90	
SFOBB-N-7	96	84	
ACCESS-N-1	87	84	
ACCESS-N-2	84	94	
ACCESS-N-3	92	84	
ACCESS-N-4	95	88	
ACCESS-N-5	100	74	

Note: Above values shown in percent survival.

Test Date:	6/19/99-6/29/99	6/29/99-7/8/99	8/3/99-8/13/99
CONTROL (% Survival)	94	94	98
Test Ref Tox (mg/L)	7.5	15.4	5.3
Lab Mean ±2SD (mg/L)	12.4±7.34	17.01±2.58	17.01±2.58
Acceptable ?	Yes	Yes	Yes

TABLE ES-2
EXECUTIVE SUMMARY OF SOLID PHASE BIOASSAY RESULTS
San Francisco-Oakland Bay Bridge
New East Span Alignment

	SF-DODS	Alcatraz	Tubbs Island	Paradise Cove
Ampelisca abdita				
SFOBB-N-1	NO	YES/7	NO	NO
SFOBB-N-2	NO	YES/8	NO	YES/7
SFOBB-N-3	NO	NO	NO	NO
SFOBB-N-4	NO	NO	NO	NO
SFOBB-N-5	NO	NO	NO	NO
SFOBB-N-6	NO	NO	NO	NO
SFOBB-N-7	NO	NO	NO	NO
ACCESS-N-1	NO	NO	NO	NO
ACCESS-N-2	NO	YES/8	NO	YES/7
ACCESS-N-3	NO	NO	NO	NO
ACCESS-N-4	NO	NO	NO	NO
ACCESS-N-5	NO	NO	NO	NO

Yes indicates significant statistical difference; number shown is differential in survival between reference and test site.
Potential solid phase toxicity is based on significant statistical difference and >20 differential

	SF-DODS	Alcatraz	Tubbs Island	Paradise Cove
Nephtys caecoides				
SFOBB-N-1	NO	NO	NO	NO
SFOBB-N-2	YES/26	YES/24	YES/18	YES/32
SFOBB-N-3	NO	NO	NO	YES/12
SFOBB-N-4	YES/8	YES/6	NO	YES/14
SFOBB-N-5	YES/22	YES/20	YES/14	YES/28
SFOBB-N-6	NO	NO	NO	NO
SFOBB-N-7	NO	NO	NO	YES/14
ACCESS-N-1	NO	NO	NO	YES/14
ACCESS-N-2	NO	NO	NO	YES/4
ACCESS-N-3	NO	NO	NO	YES/14
ACCESS-N-4	NO	NO	NO	YES/10
ACCESS-N-5	YES/18	YES/16	YES/10	YES/24

Yes indicates significant statistical difference; number shown is differential in survival between reference and test site.
Potential solid phase toxicity is based on significant statistical difference and >10 differential

TABLE ES-3
EXECUTIVE SUMMARY OF BIOACCUMULATION RESULTS
San Francisco-Oakland Bay Bridge
New East Span Alignment

	SFOBB-N-1		SFOBB-N-2		SFOBB-N-3		SFOBB-N-4		SFOBB-N-5		SFOBB-N-6		SFOBB-N-7		ACCESS-N-1		ACCESS-N-2		ACCESS-N-3		ACCESS-N-4		ACCESS-N-5	
	t-calc	diff	*t*-calc	diff	*t*-calc	diff	*t*-calc	diff	*t*-calc	diff	*t*-calc	diff	*t*-calc	diff	*t*-calc	diff	*t*-calc	diff	*t*-calc	diff	*t*-calc	diff	*t*-calc	diff
Macoma nasuta																								
Arsenic	NC		3.859	1.25	NC		1.798	1.13	0.837	1.05	0.130	1.01	NC		3.614	1.16	NC		NC		0.969	1.07	3.148	1.55
Cadmium	NC		30.187	2.80	NC		3.631	2.16	NC		NC		NC		NC		NC		1.500	1.16	NC		2.304	2.00
Chromium	NC		0.121	1.01	1.253	1.06	NC		NC		NC		NC		NC		NC		NC		NC		NC	
Copper	NC		NC		0.237	1.01	NC		NC		NC		NC		NC		NC		NC		NC		NC	
Lead	20.789	2.17	NC		13.145	1.57	3.889	1.74	12.348	2.14	25.121	2.74	3.644	4.17	13.207	2.45	13.159	2.69	5.759	2.57	17.561	3.10	12.363	3.10
Mercury	NC		NC		NC		NC		NC		NC		NC		NC		3.087	1.60	4.743	1.50	6.000	1.40	4.743	1.50
Nickel	NC		NC		2.840	1.16	NC		NC		NC		NC		NC		NC		NC		NC		NC	
Selenium	NC		11.583	1.76	NC		1.843	1.50	NC		NC		NC		NC		NC		NC		NC		1.006	1.18
Silver	NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC	
Zinc	NC		19.873	2.32	NC		2.204	1.67	NC		NC		NC		NC		NC		NC		NC		1.500	1.49
Pesticides	1.500	1.10	1.500	1.10	1.500	1.10	1.500	1.10	1.500	1.10	1.500	1.10	1.500	1.10	1.500	1.10	1.500	1.10	1.500	1.10	1.500	1.10	1.500	1.10
PCBs	NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC	
PAHs	32.424	39.58	NC		NC		NC		NC		1.478	1.53	18.614	10.88	NC		0.572	1.19	2.102	2.42	5.089	3.00	4.620	5.37

	SFOBB-N-1		SFOBB-N-2		SFOBB-N-3		SFOBB-N-4		SFOBB-N-5		SFOBB-N-6		SFOBB-N-7		ACCESS-N-1		ACCESS-N-2		ACCESS-N-3		ACCESS-N-4		ACCESS-N-5	
	t-calc	diff	*t*-calc	diff	*t*-calc	diff	*t*-calc	diff	*t*-calc	diff	*t*-calc	diff	*t*-calc	diff	*t*-calc	diff	*t*-calc	diff	*t*-calc	diff	*t*-calc	diff	*t*-calc	diff
Nephtys caecoides																								
Arsenic	6.076	1.18	NC		0.072	1.00	NC		2.908	1.13	2.767	1.14	3.594	1.11	4.707	1.13	5.563	1.15	2.658	1.17	8.591	1.36	0.835	1.09
Cadmium	NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC	
Chromium	2.809	1.11	1.450	1.08	0.618	1.03	NC		NC		NC		NC		NC		NC		NC		NC		NC	
Copper	5.328	1.20	NC		1.010	1.03	NC		NC		NC		NC		NC		NC		NC		NC		NC	
Lead	30.006	2.63	6.308	2.30	13.500	1.60	7.462	2.10	8.887	2.23	19.900	2.47	4.221	2.13	21.000	1.93	36.000	2.60	9.492	2.93	21.350	3.30	16.738	3.73
Mercury	NC		NC		NC		2.449	1.40	NC		NC		NC		NC		9.000	2.20	9.000	2.20	NC*	2.00	8.573	2.40
Nickel	NC		6.284	1.25	0.218	1.01	NC		NC		NC		NC		NC		NC		NC		NC		NC	
Selenium	NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC	
Silver	NC		2.250	1.60	NC		1.500	1.20	NC		NC		NC		NC		NC		1.500	1.20	NC		1.500	1.20
Zinc	3.252	1.10	NC		NC		NC		NC		NC		NC		NC		NC		NC		NC		NC	
Pesticides	NC		NC		NC		1.500	1.17	NC		1.500	1.77	NC		NC		NC		NC		NC		NC	
PCBs	NC		NC		NC		NC		NC		1.500	1.78	NC		NC		NC		NC		NC		NC	
PAHs	5.027	30.84	3.217	3.20	1.500	2.32	1.500	1.04	NC		2.963	1.88	7.125	1.76	NC		1.500	1.12	NC		5.477	1.80	4.174	2.52

NC = Not Calculated (average SF-DODS Reference concentration higher than average site concentration)
Critical *t* value is 1.86, DF = 8, at a 5% level of significance, one-tailed test.
* = Not able to calculate due to zero variance in each data set

TABLE ES-4
EXECUTIVE SUMMARY OF SEDIMENT SUITABILITY
San Francisco-Oakland Bay Bridge
New East Span Alignment

Site	Site Volume (m^3)	Alcatraz (SF-11) Suitable?	Alcatraz (SF-11) Volume	SF-DODS Suitable?	SF-DODS Volume	UWR Suitable?	UWR Volume	Comments
SFOBB-N-1	3,217	NO		NO		YES	3,217	Elevated PAH sediment concentrations. Significant PAH bioaccumulation (*macoma* and *nephtys*). PAH sediment concentrations similar to UWR Reference sediments.
SFOBB-N-2	9,348	NO		NO		NO		Significant solid phase toxicity (*nephtys*).
SFOBB-N-3	10,669	YES	10,669	YES	10,669	YES	10,669	
SFOBB-N-4	5,926	YES	5,926	YES	5,926	YES	5,926	
SFOBB-N-5	1,541	NO		NO		NO		Significant solid phase toxicity (*nephtys*). Some liquid/suspended phase toxicity (*strongylocentrotus*); factored LC50 greater than projected concentration at SF-11.
SFOBB-N-6	3,420	YES	3,420	YES	3,420	YES	3,420	Some liquid/suspended phase toxicity (*strongylocentrotus*); factored LC50 greater than projected concentration at SF-11.
SFOBB-N-7	3,724	YES	3,724	NO		YES	3,724	Some PAH bioaccumulation (*macoma*) Some liquid/suspended phase toxicity (*strongylocentrotus*); factored LC50 greater than projected concentration at SF-11.
Access-N-1	55,718	YES	55,718	YES	55,718	YES	55,718	
Access-N-2	56,264	YES	56,264	YES	56,264	YES	56,264	Some liquid/suspended phase toxicity (*strongylocentrotus*); factored LC50 greater than projected concentration at SF-11.
Access-N-3	56,350	YES	56,350	YES	56,350	YES	56,350	
Access-N-4	56,165	YES	56,165	YES	56,165	YES	56,165	Some liquid/suspended phase toxicity (*strongylocentrotus*); factored LC50 greater than projected concentration at SF-11.
Access-N-5	56,861	NO		NO		NO		Significant solid phase toxicity (*nephtys*). Some liquid/suspended phase toxicity (*strongylocentrotus*); factored LC50 greater than projected concentration at SF-11.
TOTAL (m^3)	**319,203**		**248,236**		**244,512**		**251,453**	
TOTAL (yd^3)	**417,502**		**324,680**		**319,810**		**328,888**	

APPENDIX H

DREDGED MATERIAL MANAGEMENT OFFICE
DISPOSAL CONCURRENCE LETTERS

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
333 MARKET STREET
SAN FRANCISCO, CALIFORNIA 94105-2197

REPLY TO
ATTENTION OF:

OCT 31 2000

Regulatory Branch(1145b)

SUBJECT: File Number 23013: San Francisco-Oakland Bay Bridge

Dennis Mulligan
California Department of Transportation
111 Grand Avenue
Oakland, California 94623

Dear Mr. Mulligan:

The U.S. Environmental Protection Agency, San Francisco Bay Conservation and Development Commission, San Francisco Bay Regional Water Quality Control Board, and the Corps of Engineers, have completed their review of the sediment test results and supplemental information for the approximately 418,000 cubic yards of sediments proposed to be dredged from the construction of the San Francisco-Oakland Bay Bridge East Span replacement project located between Yerba Buena Island and the City of Oakland in Alameda and San Francisco Counties, California. The test results and supplemental information reviewed are as follows:

1. The test results as presented in the report prepared by California Department of Transportation District 04 (Caltrans) and Geocon Consultants, Inc. entitled "Sediment Sampling and Analysis Report San Francisco-Oakland Bay Bridge East Span Seismic Safety Project Alameda and San Francisco Counties, California" Volumes 1 and 2 dated June 2000.

2. The Sampling and Analysis Plan (SAP) as presented in the report prepared by California Department of Transportation District 04 and Geocon Consultants, Inc. entitled "Amended Sampling and Analysis Plan San Francisco-Oakland Bay Bridge East Span Seismic Safety Project Alameda and San Francisco Counties, California" dated June 2000.

3. The letter from the California Department of Transportation District 04 addressed to the U.S. Army Corps of Engineers dated October 4, 2000, which provided additional information and clarification of the test results.

The members of the above inter-agency group are recommending to their respective agency's management that the material proposed for dredging from the San Francisco-Oakland Bay Bridge East Span replacement project, as characterized in the above report and supplemental information, is suitable for disposal as shown in the enclosed Table with the following comments and conditions:

1. The agencies found that there were numerous oversights by personnel during the sampling and testing. For example, the bioassays for the reference sediments from Tubbs Island and Paradise Cove were not analyzed at the same time as the bioassays from the proposed dredge sites.

2. Please note that because a sediment is found suitable for disposal at a particular location does not necessarily mean that the material can be disposed at that location. The selection of the disposal sites should be coordinated with the agencies during the permitting process. Disposal site selection needs to take into account the factors (implementability, effects and cost) and decision-making criteria in your Dredged Material Management Plan along with the suitability determination in the enclosed Table.

3. The Alcatraz Disposal Site (SF-11) is a dispersive disposal site and only material that will disperse can be disposed at SF-11. Because your material is new work and not maintenance material, any material found during dredging that is of a nature that will not easily disperse (rock, gravel, heavily consolidated material) may not be disposed at this site. An alternative disposal option will need to be found for any non-dispersive material.

4. The material below 12 feet depth (measured from top of sediment) in sample locations SFOBB-N-1 through SFOBB-N-7 is considered not to have been exposed to contaminants and has been granted an exclusion from testing by the agencies. Therefore, even though samples SFOBB-N-1, SFOBB-N-2 and SFOBB-N-5 are unsuitable for aquatic disposal, the material below 12 feet is considered suitable for disposal at the San Francisco Deep Ocean Disposal Site (SF-DODS) and (depending on grain size, etc.) suitable for in-bay disposal at SF-11. Because the agencies maintain data on the volumes of material suitable for different disposal locations, the agencies request that Caltrans provide the volume of material below the 12 foot level, as described above, for these three sites.

5. Material from Sites SFOBB-N-2, SFOBB-N-5 and Access-N-5 is not suitable for unconfined aquatic disposal because of significant solid phase toxicity to Nephtys when compared to the reference sites. However, no amphipods exhibited significant toxicity in these samples. The agencies note that it is unusual to find significant solid phase toxicity to Nephtys and a high survival in Ampelisca (e.g., the for Access-N-5 amphipod toxicity tests showed 100% survival in all five replicates). It is possible there could have been some confounding factors involved in the toxicity to Nephtys, but none were described or discussed in the report. Because of the volumes involved (especially Access-N-5), Caltrans may want to consider testing these sites at a higher resolution. The agencies would not require bioaccumulation testing for this higher resolution testing. Caltrans should submit any proposal for additional testing to the agencies for approval prior to the start of sampling or testing.

6. The reason the material from Site SFOBB-N-1 is unsuitable for unconfined aquatic disposal (ocean and SF-11) and wetland surface is the excessive bioaccumulation of individual constituents of polynuclear aromatic hydrocarbons (PAHs).

Please be advised that this letter does not constitute an authorization to proceed with your dredge project. You must first obtain Federal, State and local permits as appropriate.

Should you have any questions please call or write Mr. David Dwinell of our Operations and Readiness Division (415-977-8471), and refer to the file number at the head of this letter.

Sincerely,

ORIGINAL SIGNED
By
Calvin C. Fong
For
Max R. Blodgett
Chief, Operations and
Readiness Division

Enclosure

Copies Furnished:

US EPA, San Francisco, CA, Attn: Dadey
CA BCDC, San Francisco, CA, Attn: Goldbeck
CA RWQCB, Oakland, CA, Attn: Collins
CA SLC, Sacramento, CA, Attn: Howe
CA F&G, Menlo Park, CA, Attn: Ota
US NMFS, Santa Rosa, CA, Attn: Mulvey

Suitability Determination						
	Volume		Wetland		Wetland	Construction
DU ID	(CY)	Ocean	Surface *	SUAD	Foundation *	Fill *
SFOBB-N-1	4,208				X	X
SFOBB-N-2	12,227				X	X
SFOBB-N-3	13,955	X	X	X	X	X
SFOBB-N-4	7,751	X	X	X	X	X
SFOBB-N-5	2,016				X	X
SFOBB-N-6	4,473	X	X	X	X	X
SFOBB-N-7	4,871	X	X	X	X	X
Access-N-1	72,876	X	X	X	X	X
Access-N-2	73,591	X	X	X	X	X
Access-N-3	73,703	X	X	X	X	X
Access-N-4	73,461	X	X	X	X	X
Access-N-5	74,371				X	X
Total	417,503	324,681	324,681	324,681	417,503	417,503

* May be suitable for use, depending on the characteristics of the proposed disposal sites and project specifications. For Wetland Foundation and Construction fill, an additional analysis of the leaching potential of the sediments, using a modified waste extraction test (WET), may be necessary to determine final suitability.

STATE OF CALIFORNIA - BUSINESS, TRANSPORTATION AND HOUSING AGENCY GRAY DAVIS, Governor

DEPARTMENT OF TRANSPORTATION
BOX 23660
OAKLAND, CA 94623-0660
(510) 286-4444
TDD (510) 286-4454

June 19, 2001

Mr. David Dwinell, US Army Corps of Engineers
Mr. Jim Delorey, US Army Corps of Engineers
Mr. Larry Fade, US Army Corps of Engineers
Ms. Kathy Dadey, US Environmental Protection Agency
Mr. Brian Ross, US Environmental Protection Agency
Mr. Steve Goldbeck, SF Bay Conservation and Development Commission
Ms. Brenda Goeden, SF Bay Conservation and Development Commission
Ms. Glynnis Collins, Regional Water Quality Control Board
Ms. Becky Ota, California Department of Fish and Game
Ms. Mary Howe, State Lands Commission

Subject: Request for Concurrence from Dredged Material Management Office (DMMO) in Dredged Material Disposal Plan
San Francisco-Oakland Bay Bridge (SFOBB) East Span Seismic Safety Project (East Span Project) on Interstate 80, Crossing San Francisco Bay
(04-SF-80 KP 12.2/Kp 14.3, 04-ALA-80 KP 0.0/KP 2.1)

U.S. Army Corps of Engineers file #: 23013

Dear DMMO Members:

The California Department of Transportation (Department) is proposing to replace the existing East Span of the SFOBB. This project is critical to providing increased seismic safety to the occupants of approximately 272,000 vehicles that use the SFOBB each day. The Department has consulted with DMMO members concerning the East Span Project and is currently preparing an application to dispose of dredged materials generated by the construction of the proposed new East Span structure.

The DMMO has provided valuable guidance to the Department concerning recent large-scale dredged material testing and disposal plans. Consistent with the Long Term Management Strategy for Placement of Dredged Material in the San Francisco Bay Region (LTMS), the Department is pleased to report to the DMMO that the total volume of dredged material generated by seismic safety projects, which was proposed for placement in-bay at SF-11, has been significantly reduced. The Department has minimized dredged material disposal for the Richmond-San Rafael Bridge, including the access channel, and Carquinez Bridge seismic safety projects, reducing in-bay disposal volumes planned for SF-11 by approximately 191,139 cubic meters (215,000 cubic yards). This reduction amounts to 90% of approved volume for these contracts.

On June 6, 2001, the Department presented the dredged material disposal and beneficial reuse plan for the East Span Project to the DMMO. This plan is based on the assumption that Replacement Alternative N-6, the preferred alternative, will be selected as the project in the Record of Decision. Based on input received from DMMO members at the June 6 meeting, the Department requests written concurrence with the dredged material disposal/reuse plan as described below. The disposal reuse plan addresses the dredged material for which the DMMO provided a suitability letter on October 31, 2000. In the suitability letter, the DMMO determined that some material proposed to be dredged in the area adjacent to the north of the Oakland Touchdown area was not suitable for unconfined aquatic disposal. This area is no longer included in the proposed dredging footprint because the length of the access channel has been substantially reduced. As a result, all materials included in the plan meet DMMO criteria for unconfined aquatic disposal at the disposal and reuse sites proposed in the disposal/reuse plan presented by the Department (see quantities in the enclosed Figures).

The first component of the plan calls for the disposal of up to 165,320 cubic meters (216,230 cubic yards) of dredged material at the San Francisco-Deep Ocean Disposal Site (SF-DODS). This material, to be dredged in the initial construction phase, will be generated by the construction of a barge access channel along the north side of the replacement East Span. (See attached Dredging Episode 1 Figure).

The second component of the plan will be the dredging and disposal of up to 143,038 cubic meters (187,087 cubic yards) to construct the piers for the replacement East Span. This material will be dredged in small quantities over 4 years as each pier is constructed. Because of the small monthly volumes to be generated over the 4-year period, the Department plans to dispose of this material at the SF-11 site. Within the piles, materials will be dredged to a depth of approximately 50 meters (164 feet) below bay bottom. The Department proposes to disperse all material dredged from within the piles at SF-11 except the upper 3.66 meters (12 feet) of Piers E20, E21, and E22 (SAP testing location: SFOBB N1 and SFOBB N2) as recommended by DMMO; these materials will be disposed of at appropriate upland facilities. (See Dredging Episode 2 Figure).

When construction is completed and the new structure is opened to vehicular traffic, the Department will begin the third and fourth components of the project: dismantling of the existing East Span. First, a dismantling access channel will be constructed to the south of the existing East Span and dredging this channel will generate up to 145,785 cubic meters (190,680 cubic yards) of dredge material. Based on current sampling for the replacement structure and previous sampling for the retrofit alternative, it is assumed that the material is suitable for unconfined aquatic disposal. (See Dredging Episode 3 Figure). The Department intends to beneficially reuse material dredged to construct the dismantling access channel at the Hamilton restoration site, assuming the site is operational, can accept the materials, and reuse is practicable. Second, up to an additional 17,374 cubic meters (22,724 cubic yards) of dredged material generated by the removal of existing East Span piers to 0.45 meters (1.5 feet) below the mud line is proposed for disposal at the SF-11 site. (See Dredging Episode 4 Figure). It is understood that additional sampling will be required prior to these components to determine the suitability of the material for disposal. A supplemental Sampling and Analysis Plan (SAP) will be submitted to the DMMO prior to this dredging operation.

Your concurrence with the disposal plan will facilitate the timely construction of this vitally important public safety project. Once the Department receives your concurrence, we will pursue all appropriate permits from various regulatory agencies.

Please contact Allen Baradar, SFOBB Senior Environmental Engineer, at (510) 286-5636 if you have questions or need additional information.

Sincerely,

HARRY Y. YAHATA
District Director

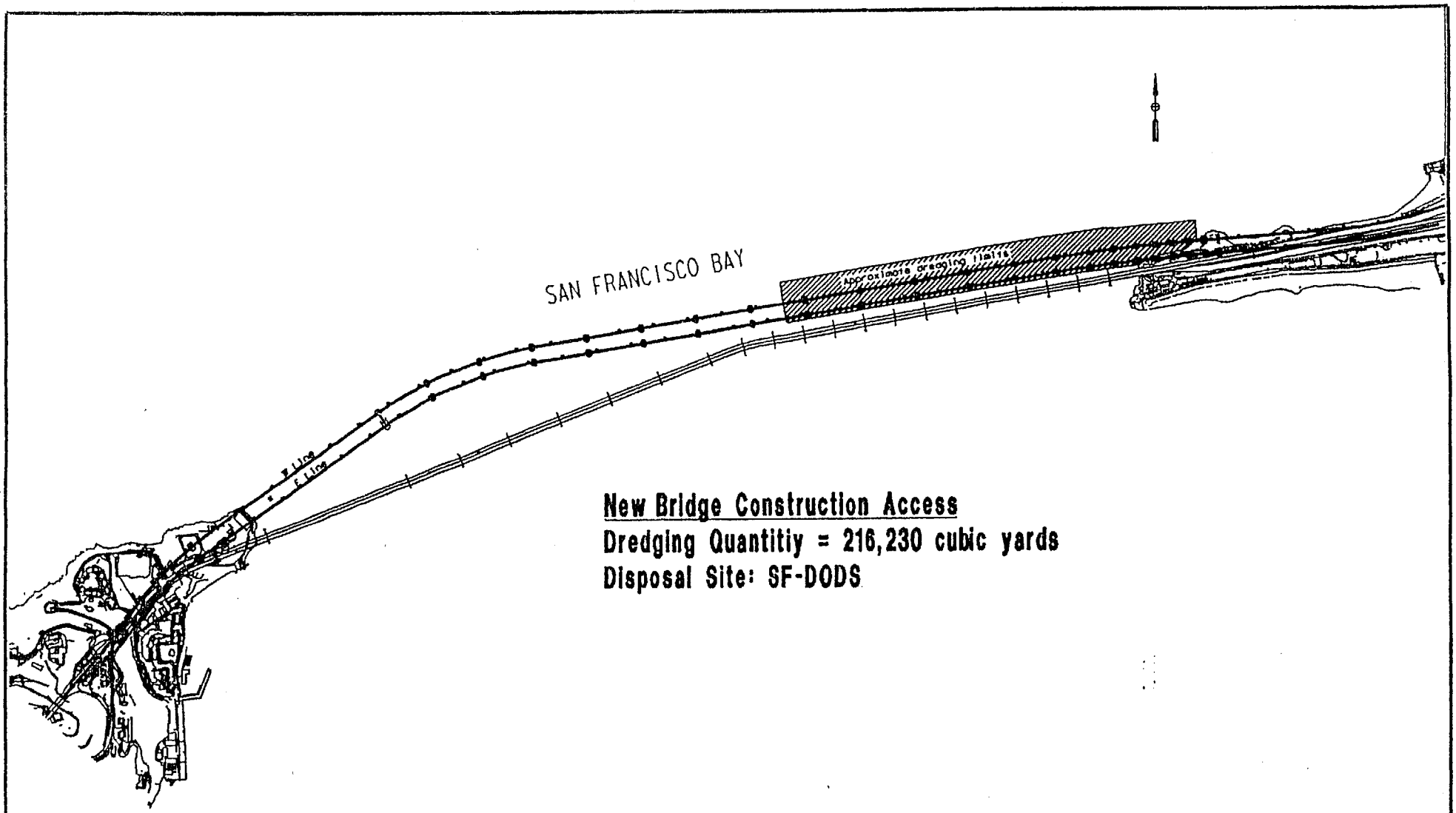
by

Allen Baradar

for MARA MELANDRY
Environmental Manager, SFOBB

cc:
Ms. Alexis Strauss, Director, Water Division, US Environmental Protection Agency
Lieutenant Colonel Timothy S. O'Rourke, District Engineer, US Army Corps of Engineers
Ms. Loretta Barsamian, Executive Officer, San Francisco Regional Water Quality Control Board
Mr. Will Travis, Executive Director, SF Bay Conservation and Development Commission
Mr. Bill Wong, FHWA
Mr. Paul Hensley, Toll Bridge Program Manager, Department of Transportation

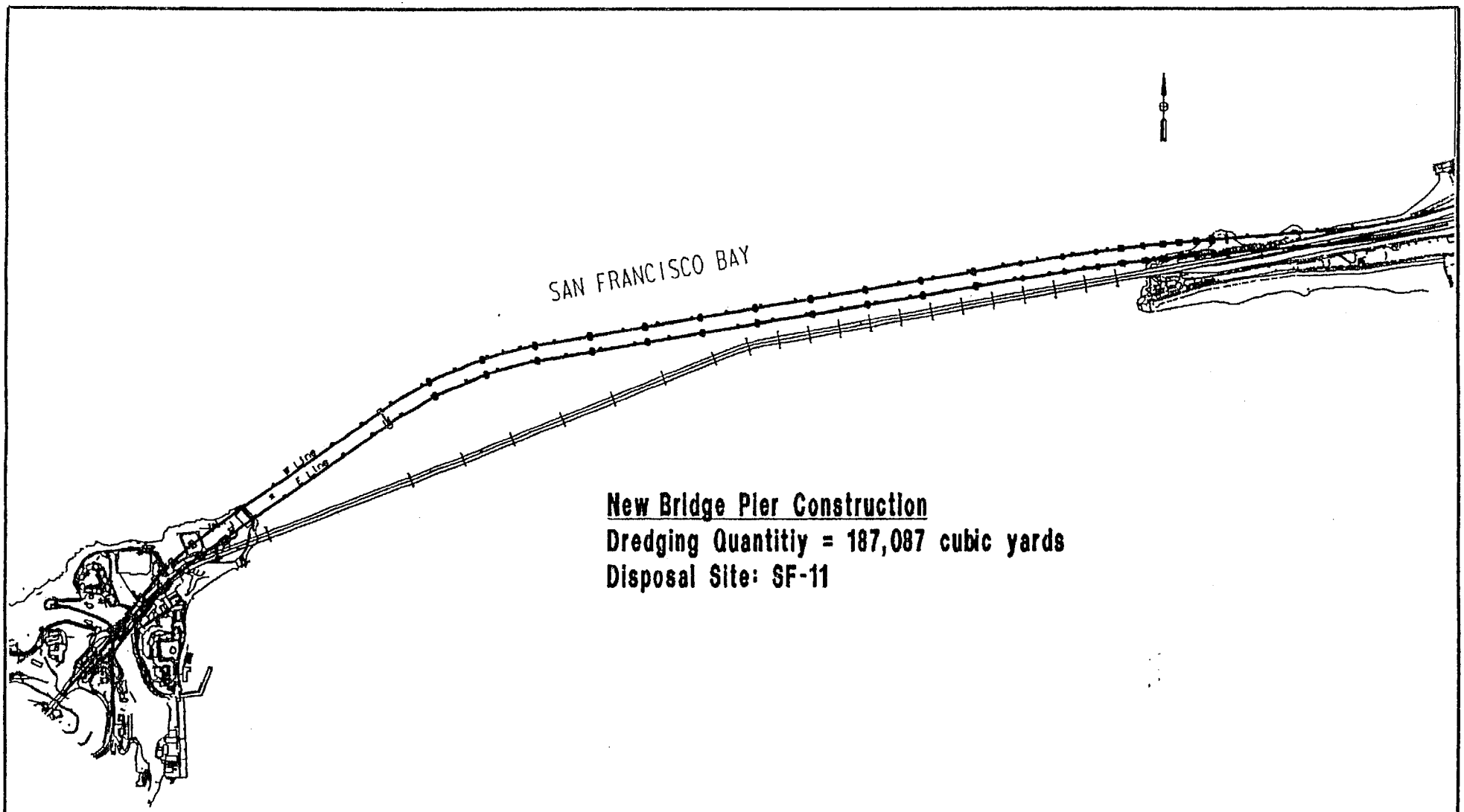
04 SF K12.2/KP14.3
04 Ala KP0.0/KP2.1
EA 012000
File title: dmmofinal



New Bridge Construction Access
Dredging Quantitiy = 216,230 cubic yards
Disposal Site: SF-DODS

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

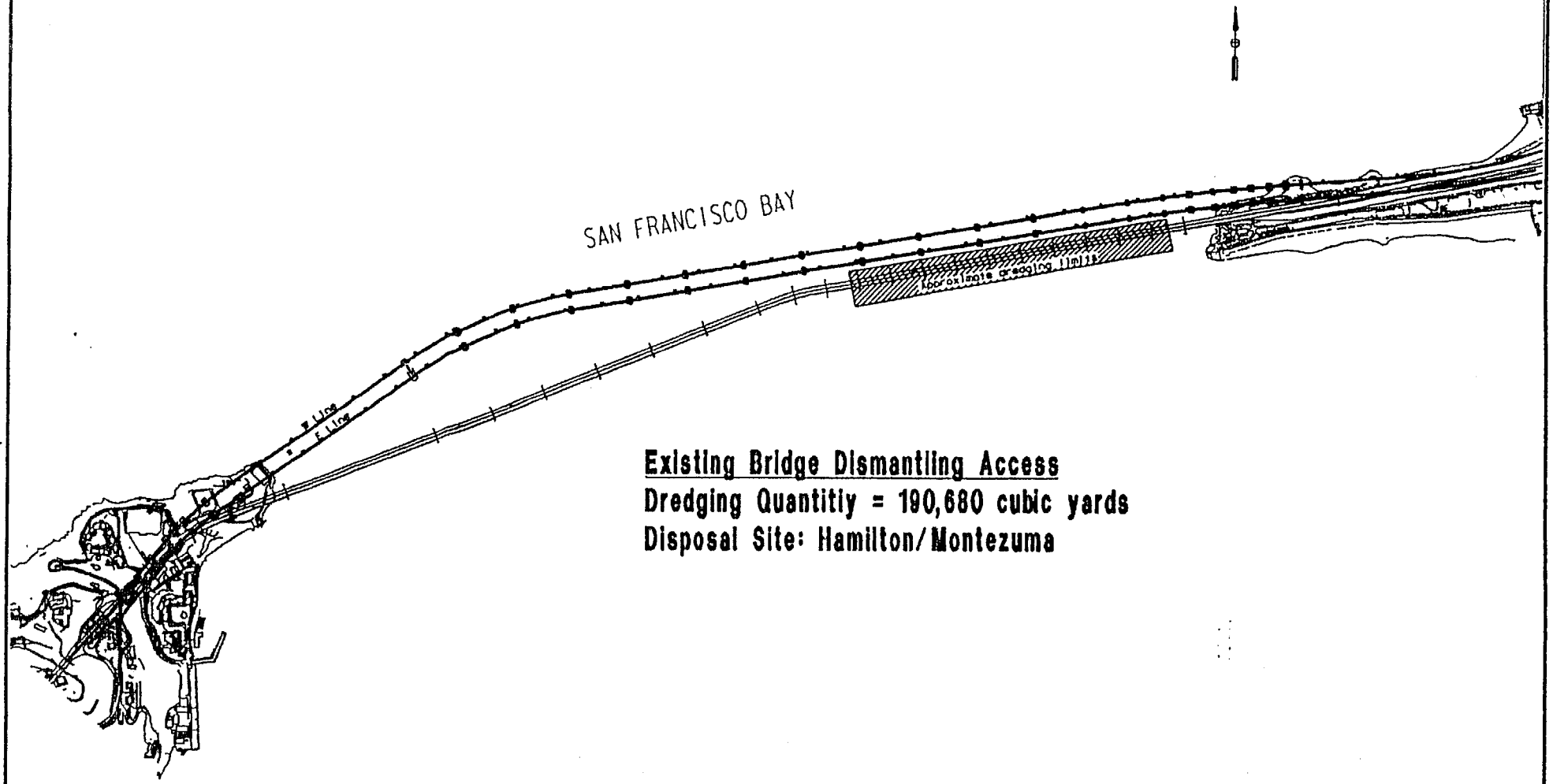
San Francisco-Oakland Bay Bridge New East Span
New Bridge Construction Access
Dredging Episode 1
June 2001



New Bridge Pier Construction
Dredging Quantitiy = 187,087 cubic yards
Disposal Site: SF-11

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

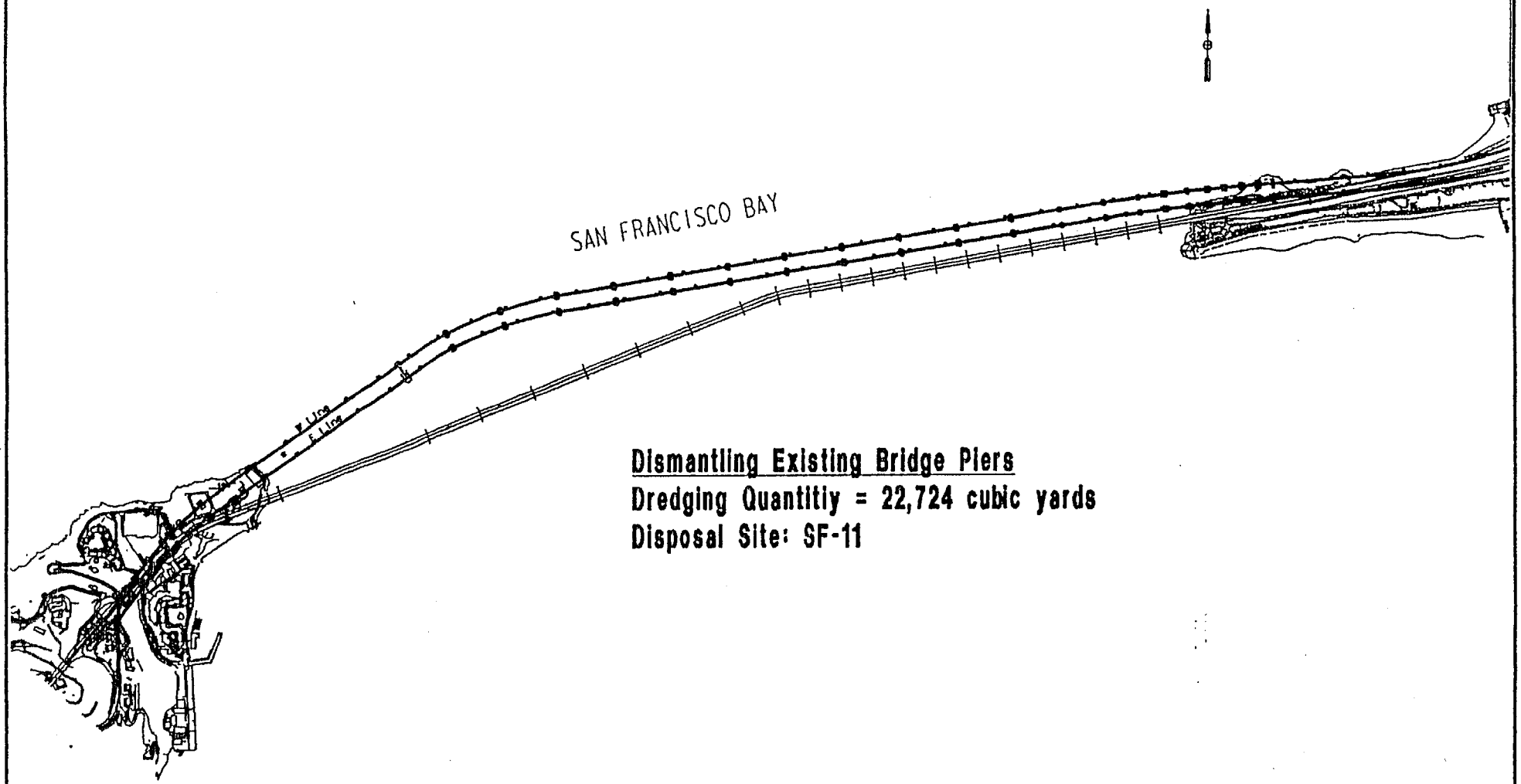
San Francisco-Oakland Bay Bridge New East Span
New Bridge Pier Construction
Dredging Episode 2
June 2001



Existing Bridge Dismantling Access
Dredging Quantitiy = 190,680 cubic yards
Disposal Site: Hamilton/Montezuma

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

San Francisco-Oakland Bay Bridge New East Span
Existing Bridge Dismantling Access
Dredging Episode 3
June 2001



Dismantling Existing Bridge Piers
Dredging Quantitiy = 22,724 cubic yards
Disposal Site: SF-11

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

San Francisco-Oakland Bay Bridge New East Span
Dismantling Existing Bridge Piers
Dredging Episode 4
June 2001

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
333 MARKET STREET
SAN FRANCISCO, CALIFORNIA 94105-2197

Regulatory Branch (1145b) JUL 3 0 2001

SUBJECT: File Number 23013S

Mr. Dennis Mulligan
California Department of Transportation
111 Grand Avenue
Oakland, California 94623--660

Dear Mr. Mulligan:

The U.S. Environmental Protection Agency, San Francisco Bay Conservation and Development Commission, San Francisco Bay Regional Water Quality Control Board, and the Corps of Engineers, have completed their review of your June 19, 2001 letter that details your proposed disposal locations for the dredged material from your San Francisco - Oakland Bay Bridge (SFOBB) East Span Seismic Safety Project.

The above inter-agency group concurs with your proposed disposal locations for the material from the San Francisco - Oakland Bay Bridge (SFOBB) East Span Seismic Safety Project as detailed in the above letter and look forward to receiving your permit application. Please note that although the agencies concur to you letter, actual approval of the disposal locations is only provided when you receive your various permits.

Please be advised that this letter does not constitute an authorization to proceed with your dredge project. You must first obtain Federal, State and local permits as appropriate.

Should you have any questions please call or write to Mr. David Dwinell of our Operations-Readiness Division (415-977-8471), and refer to the file number at the head of this letter.

Sincerely,

ORIGINAL SIGNED
By
Max R. Blodgett

Max R. Blodgett
Chief, Operations-
Readiness Division

Copies Furnished:

US EPA, San Francisco, CA, Attn: Dadey
CA BCDC, San Francisco, CA, Attn: Goldbeck
CA RWQCB, Oakland, CA, Attn: Collins
CA SLC, Sacramento, CA, Attn: Howe
CA F&G, Menlo Park, CA, Attn: Ota
US NMFS, Santa Rosa, CA Attn: Mulvey

CF:

CESPN-OR Rdg File
CESPN-OR-R Rdg File
CESPN-OR-DM(DWINELL)

DWINELL
CESPN-OR-DM
7-8471
July 5, 2001

WIRTZ
CESPN-OR-R

FONG
CESPN-OR-R

BLODGETT
CESPN-OR

STATE OF CALIFORNIA - BUSINESS, TRANSPORTATION AND HOUSING AGENCY GRAY DAVIS, Governor

DEPARTMENT OF TRANSPORTATION
BOX 23660
OAKLAND, CA 94623-0660
(510) 286-4444
TDD (510) 286-4454

August 15, 2001

Mr. David Dwinell, US Army Corps of Engineers
Mr. Jim Delorey, US Army Corps of Engineers
Mr. Larry Fade, US Army Corps of Engineers
Ms. Kathy Dadey, US Environmental Protection Agency
Mr. Brian Ross, US Environmental Protection Agency
Mr. Steve Goldbeck, SF Bay Conservation and Development Commission
Ms. Brenda Goeden, SF Bay Conservation and Development Commission
Ms. Glynnis Collins, Regional Water Quality Control Board
Ms. Becky Ota, California Department of Fish and Game
Ms. Mary Howe, State Lands Commission

Subject: Amendment to Dredged Material Disposal Plan, Described in Caltrans Letter Dated June 19, 2001
San Francisco-Oakland Bay Bridge (SFOBB) East Span Seismic Safety Project (East Span Project) on Interstate 80, Crossing San Francisco Bay
(04-SF-80 KP 12.2/Kp 14.3, 04-ALA-80 KP 0.0/KP 2.1)

U.S. Army Corps of Engineers file #: 23013

Dear DMMO Members:

This is to inform you of a minor correction in the proposed disposal plan described in our letter of June 19, 2001. On page 2, paragraph 3 the letter stated that:

"The Department proposes to disperse all material dredged from within the piles at SF-11 except the upper 3.66 meters (12 feet) of Piers E20, E21, and E22 (SAP testing location: SFOBB N1 and SFOBB N2) as recommended by DMMO; these materials will be disposed of at appropriate upland facilities. (See Dredging Episode 2 Figure)."

In fact, the correct pier numbers and their locations are as follow:

E1 through E6 for Sediment Sampling Plan (SAP) testing locations SFOBB N1 & SFOBB N2
E15 through E18 for Sediment Sampling Plan (SAP) testing location SFOBB N5

The materials from these locations will be disposed of at appropriate upland facilities as recommended by DMMO.

Your concurrence with dredged material disposal plan as described will be appreciated. Please contact Allen Baradar, SFOBB Senior Environmental Engineer, at (510) 286-5636 if you have questions or need additional information.

Sincerely,

HARRY Y. YAHATA
District Director

by

for Allen Baradar
MARA MELANDRY
Environmental Manager, SFOBB

04 SF K12.2/KP14.3
04 Ala KP0.0/KP2.1
EA 012000
File title: dmmofinal

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
333 MARKET STREET
SAN FRANCISCO, CALIFORNIA 94105-2197

AUG 17 2001

Regulatory Branch

SUBJECT: File Number 23013S

Ms. Mara Melandry
California Department of Transportation
P.O. Box 23660
Oakland, California 94623-0660

Dear Ms. Melandry:

The U.S. Environmental Protection Agency, San Francisco Bay Conservation and Development Commission, San Francisco Bay Regional Water Quality Control Board, and the Corps of Engineers, have completed their review of your August 15, 2001 letter (Subject: Amendment to Dredged Material Disposal Plan, Described in Caltrans Letter Dated June 19, 2001: San Francisco-Oakland Bay Bridge (SFOBB) East Span Seismic Safety Project (East Span Project) on Interstate 80, crossing San Francisco Bay (04-SF-80 KP 12.2/Kp 14.3, 04-ALA-80 KP 0.0/KP 2.1); U.S. Army Corps of Engineers file #:23013) that provides minor corrections in the proposed disposal plan described in your California Department of Transportation letter dated June 19, 2001. Your June 19, 2001 provided proposed disposal locations for the dredged material from your San Francisco - Oakland Bay Bridge (SFOBB) East Span Seismic Safety Project. The agencies provided concurrence to your June 19, 2001 letter in a letter from the U.S. Army Corps of Engineers addressed to the California Department of Transportation dated July 6, 2001.

The above inter-agency group concurs with the minor corrections detailed in your August 15, 2001 letter. Please note that although the agencies concur to your letter, actual approval of the disposal locations is only provided when you receive your various permits.

Please be advised that this letter does not constitute an authorization to proceed with your dredge project. You must first obtain Federal, State and local permits as appropriate.

Should you have any questions please call or write to Mr. David Dwinell of our Operations-Readiness Division (415-977-8471), and refer to the file number at the head of this letter.

Sincerely,

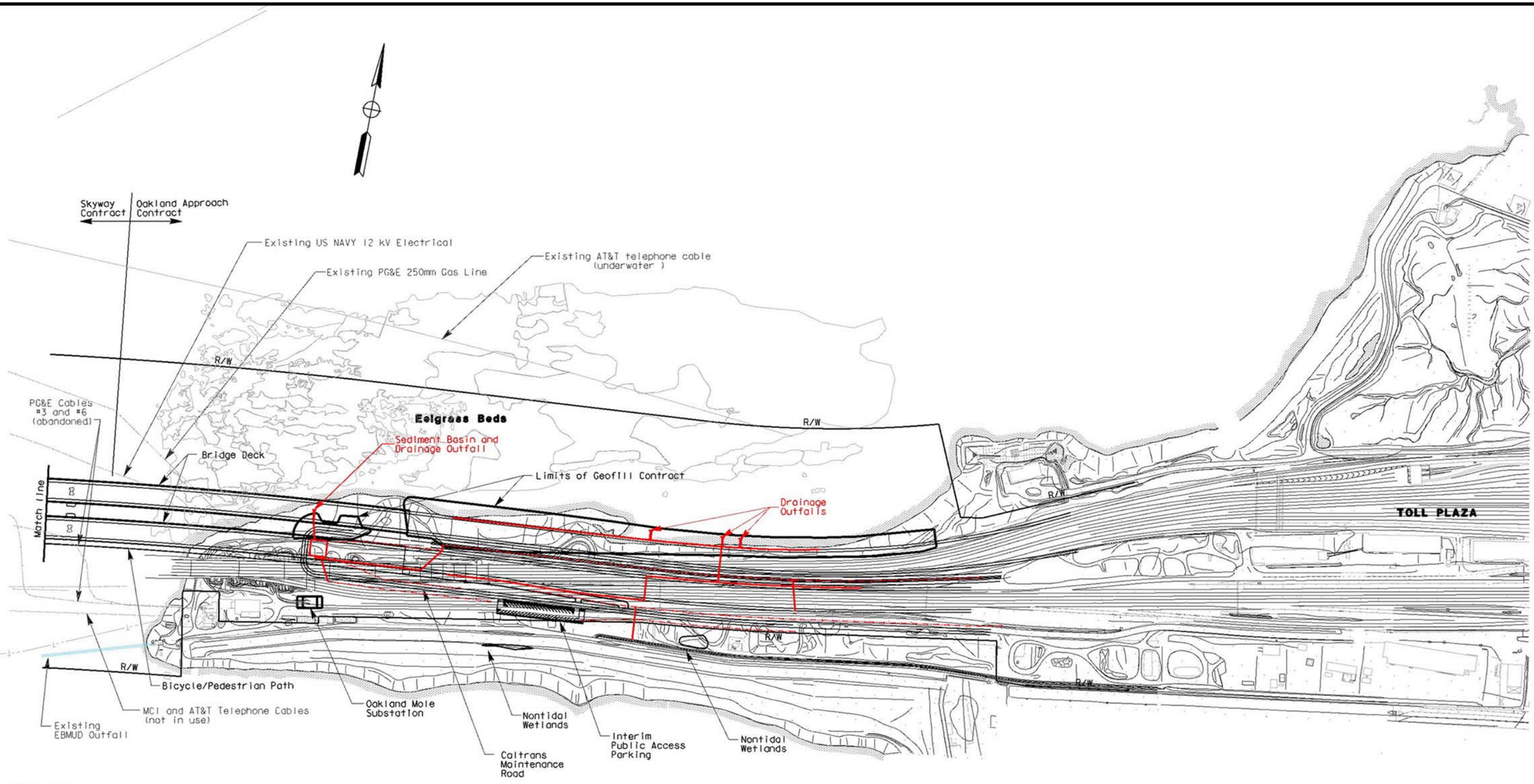
Max R. Blodgett
Chief, Operations-
Readiness Division

Copies Furnished:

US EPA, San Francisco, CA, Attn: Dadey
CA BCDC, San Francisco, CA, Attn: Goldbeck
CA RWQCB, Oakland, CA, Attn: Collis
CA SLC, Sacramento, CA, Attn: Howe
CA F&G, Menlo Park, CA, Attn: Ota
US NMFS, Santa Rosa, CA, Attn: Mulvey

APPENDIX I

EAST SPAN PROJECT DRAINAGE PLAN



General Notes:

1. See Contract Drawings for Construction Details.
2. This plan is not to scale. See Contract Plans for scaled drawings.
3. Drainage Facilities are subject to change.

Legend:

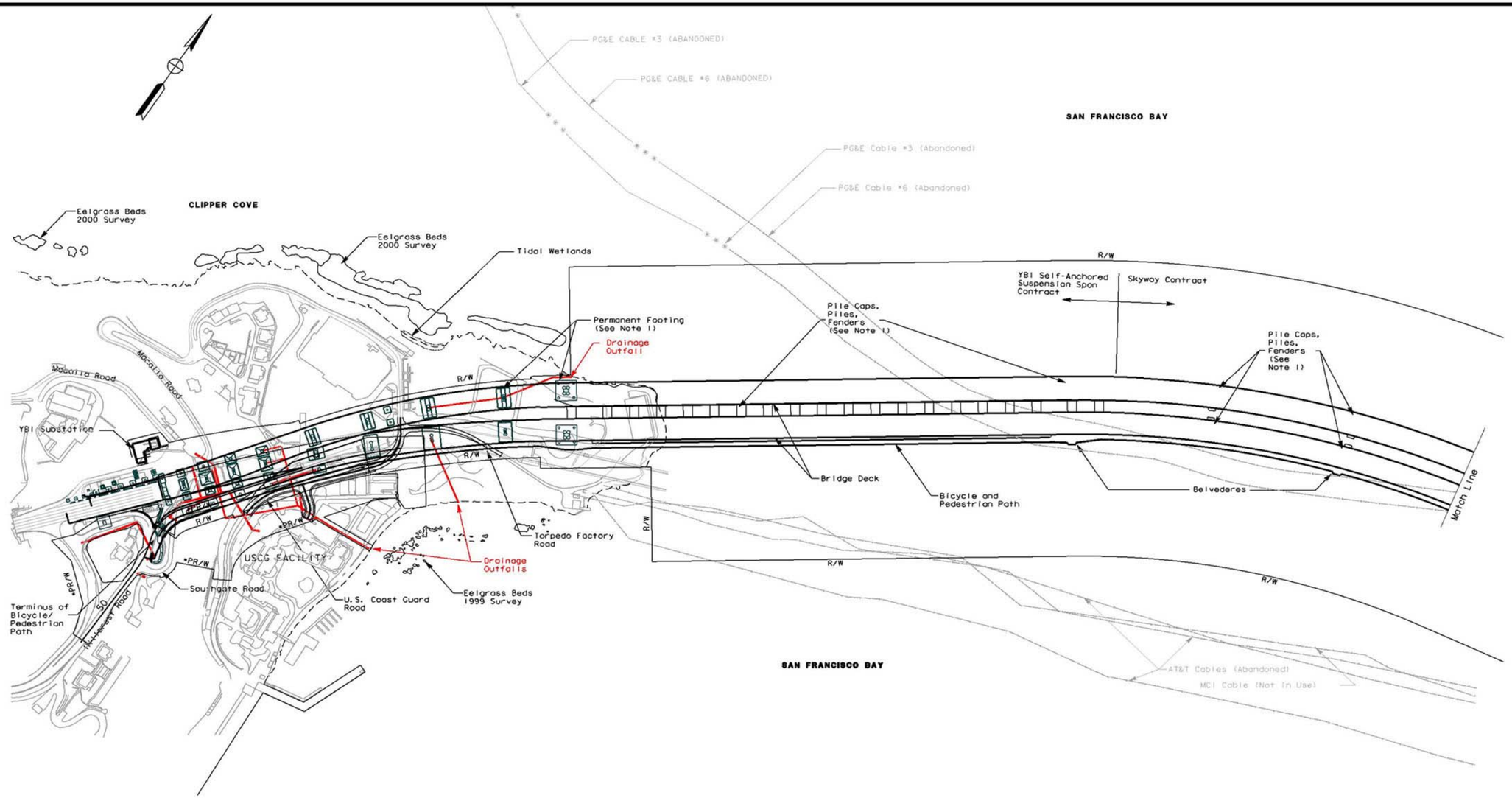
R/W - Permanent Right of Way

09 September 2001

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Not to Scale

Proposed Drainage Improvements
Oakland Approach and Geofill Contracts



General Notes:

1. See Contract Drawings for Construction Details.
2. This plan is not to scale. See Contract Plans for scaled drawings.
3. Drainage Facilities are subject to change.

Legend:

R/W - Permanent Right of Way

*PR/W - Pending Right of Way. See Property Interest Map for Right of Way Status

07 September 2001

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

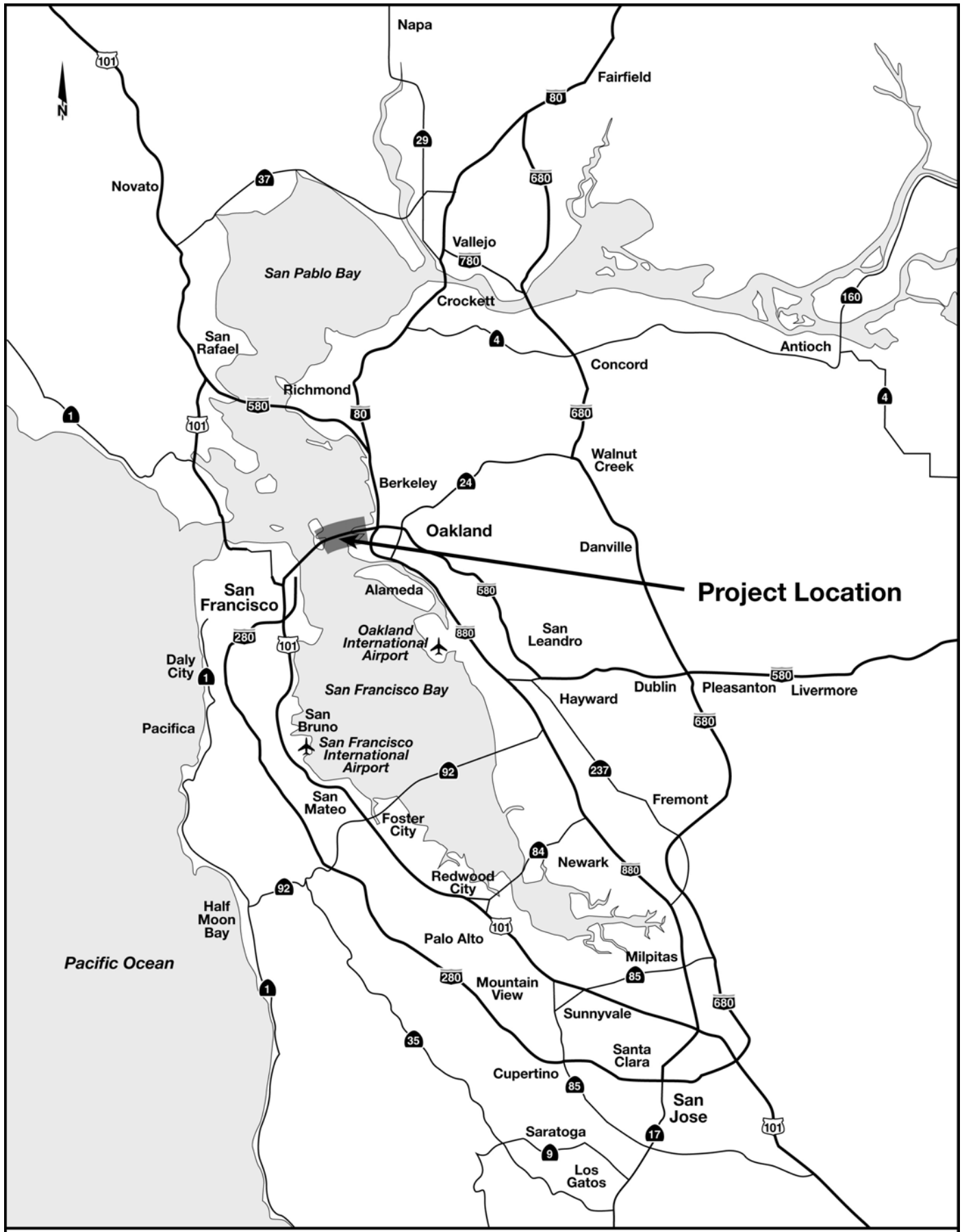
Not to Scale

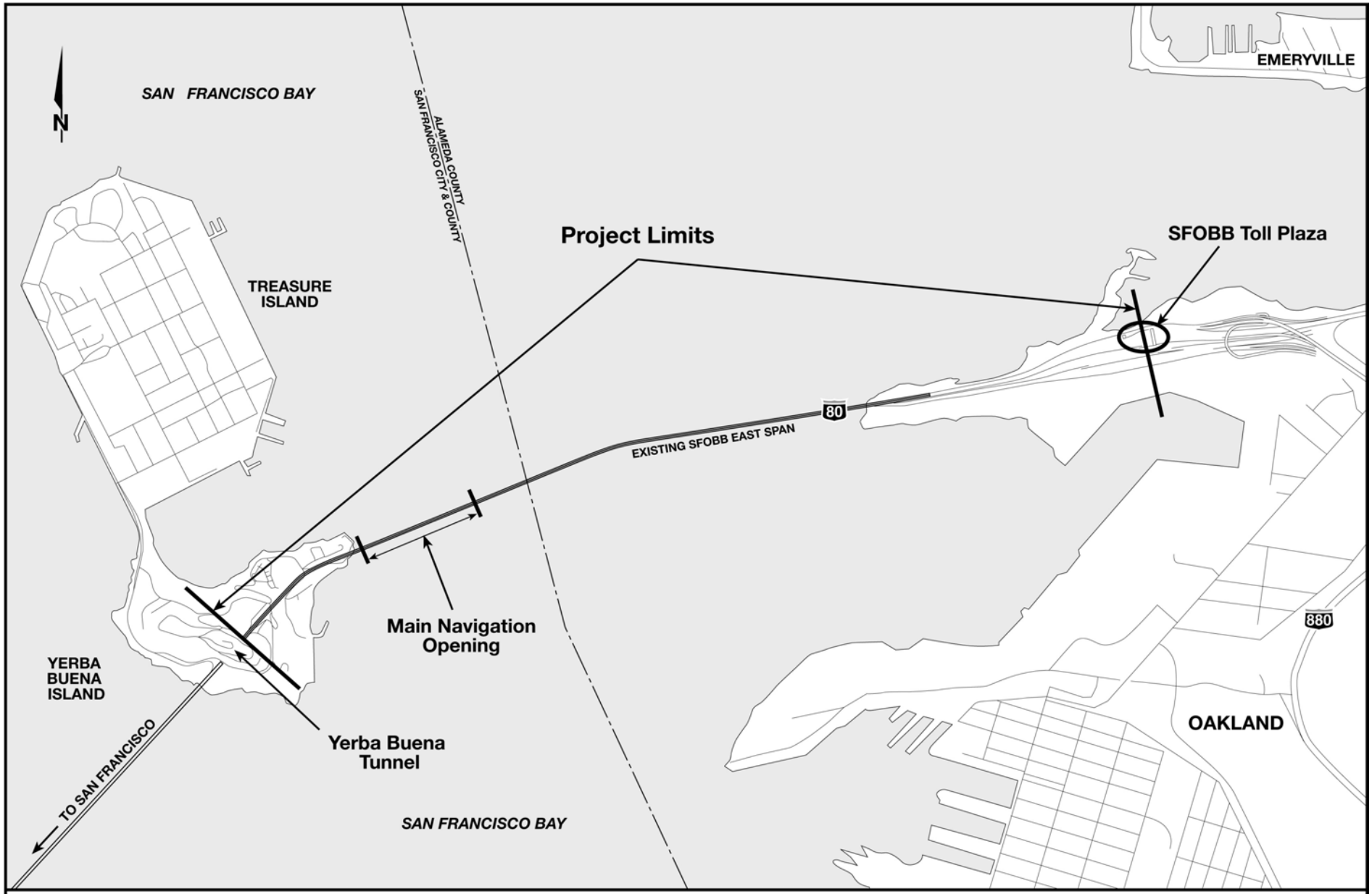
Proposed Drainage Improvements
YBI/ Self - Anchored Suspension Span Contract

SECTION 4

FIGURES

LIST OF FIGURES


Napa
Fairfield
Novato
Vallejo
San Pablo Bay
Crockett
San Rafael
Antioch
Concord
Richmond
Walnut Creek
Berkeley
Oakland
Danville
Project Location
San Francisco
Alameda
Oakland International Airport
San Leandro
Daly City
San Francisco Bay
Hayward
Dublin
Pleasanton
Livermore
Pacifica
San Bruno
San Francisco International Airport
Fremont
San Mateo
Foster City
Newark
Redwood City
Half Moon Bay
Palo Alto
Milpitas
Pacific Ocean
Mountain View
Sunnyvale
Santa Clara
Cupertino
San Jose
Saratoga
Los Gatos
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT
SCALE
0 5 10 15 Miles
Project Location
Figure 1



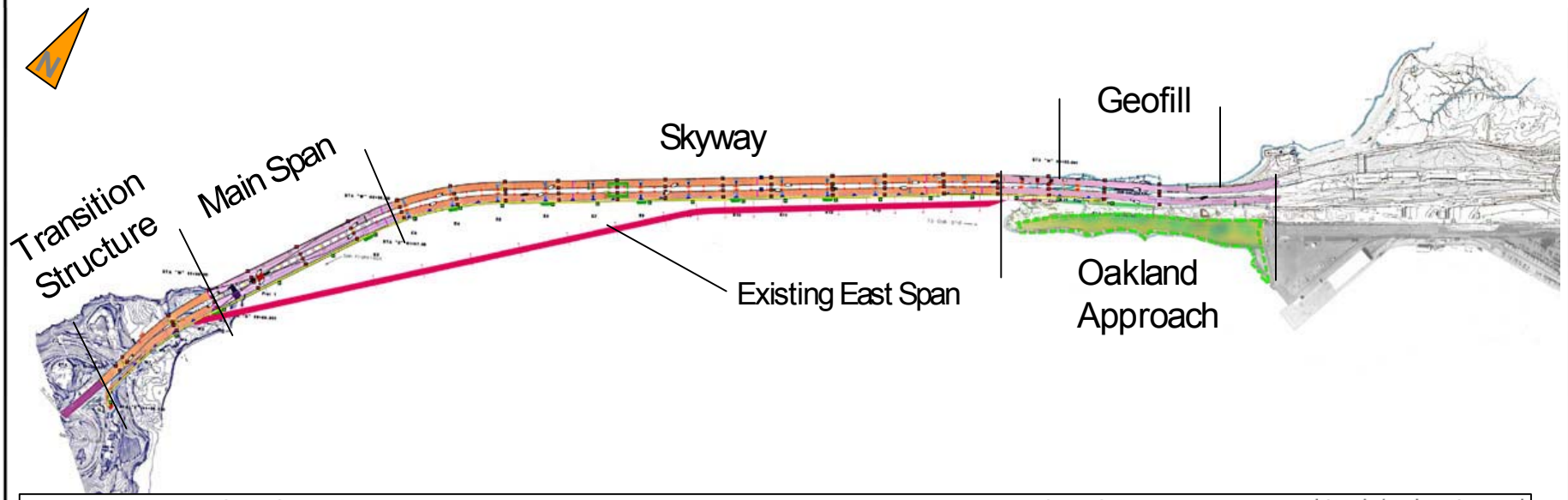
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

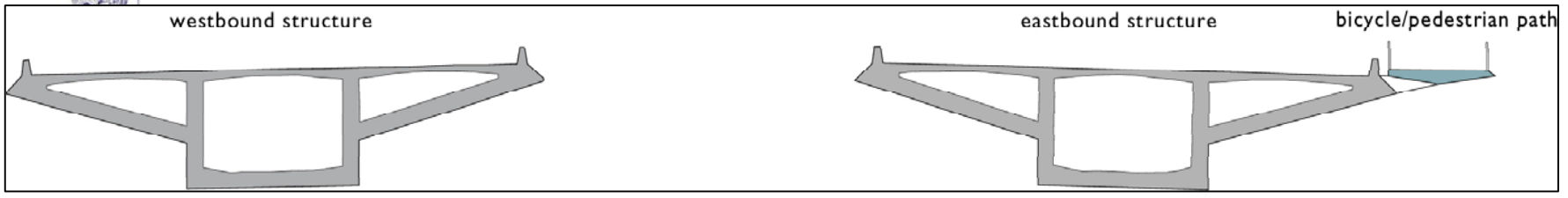
GRAPHIC SCALE 1:27,500

0 500 1000 2000 Feet

Project Limits

Figure 2





Skyway Cross-Section

- Located on an alignment north of the existing bridge
- Bridge contracts include YBI Transition Structure / Main Span, Skyway, Oakland Approach Structure and the Geofill
- Approximately 2.2 miles long, with 2% grade
- Two side-by-side structures
- Unified design from end-to-end
- Bicycle and pedestrian path located on south side of bridge on eastbound deck

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Not to Scale

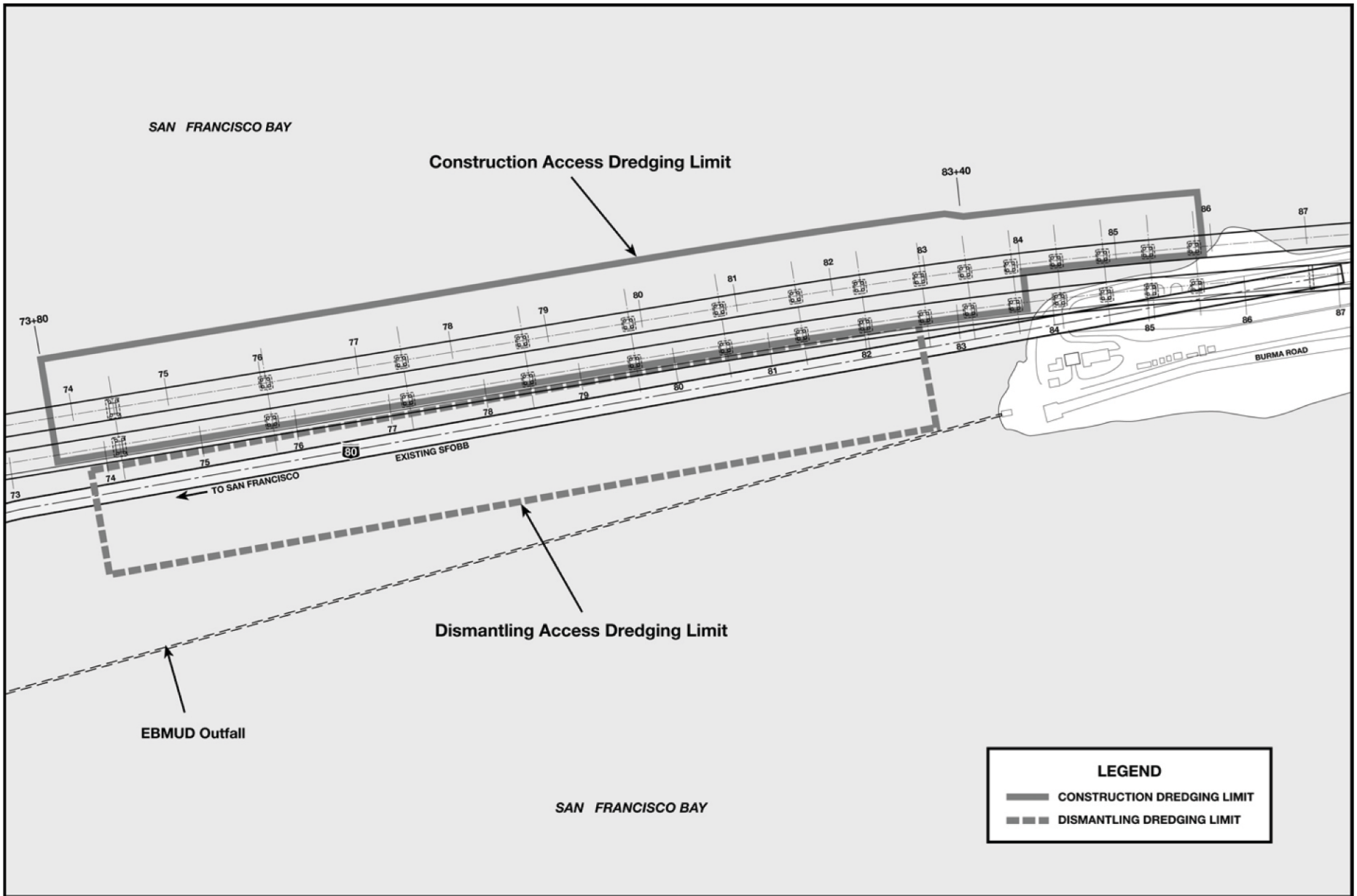
Project Overview

Figure 3

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Typical Geotube

Figure 4

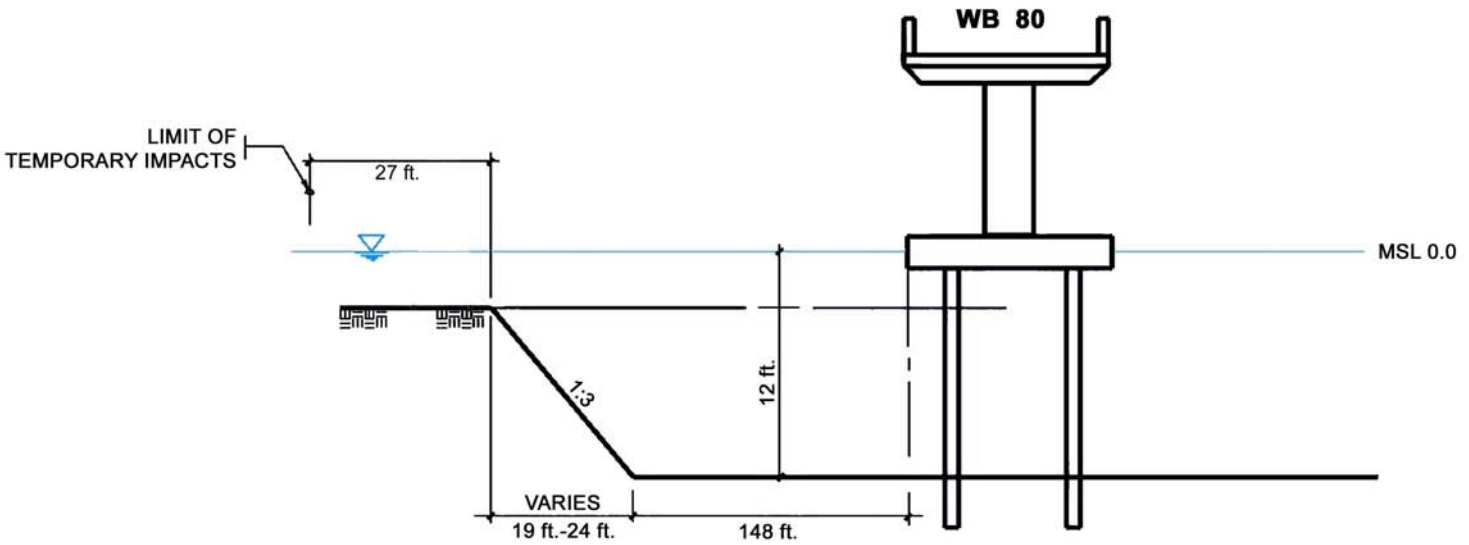


SFOBB EAST SPAN SEISMIC SAFETY PROJECT

GRAPHIC SCALE 1:8,000
0 50 100 150 m

Construction Dredging

Figure 5



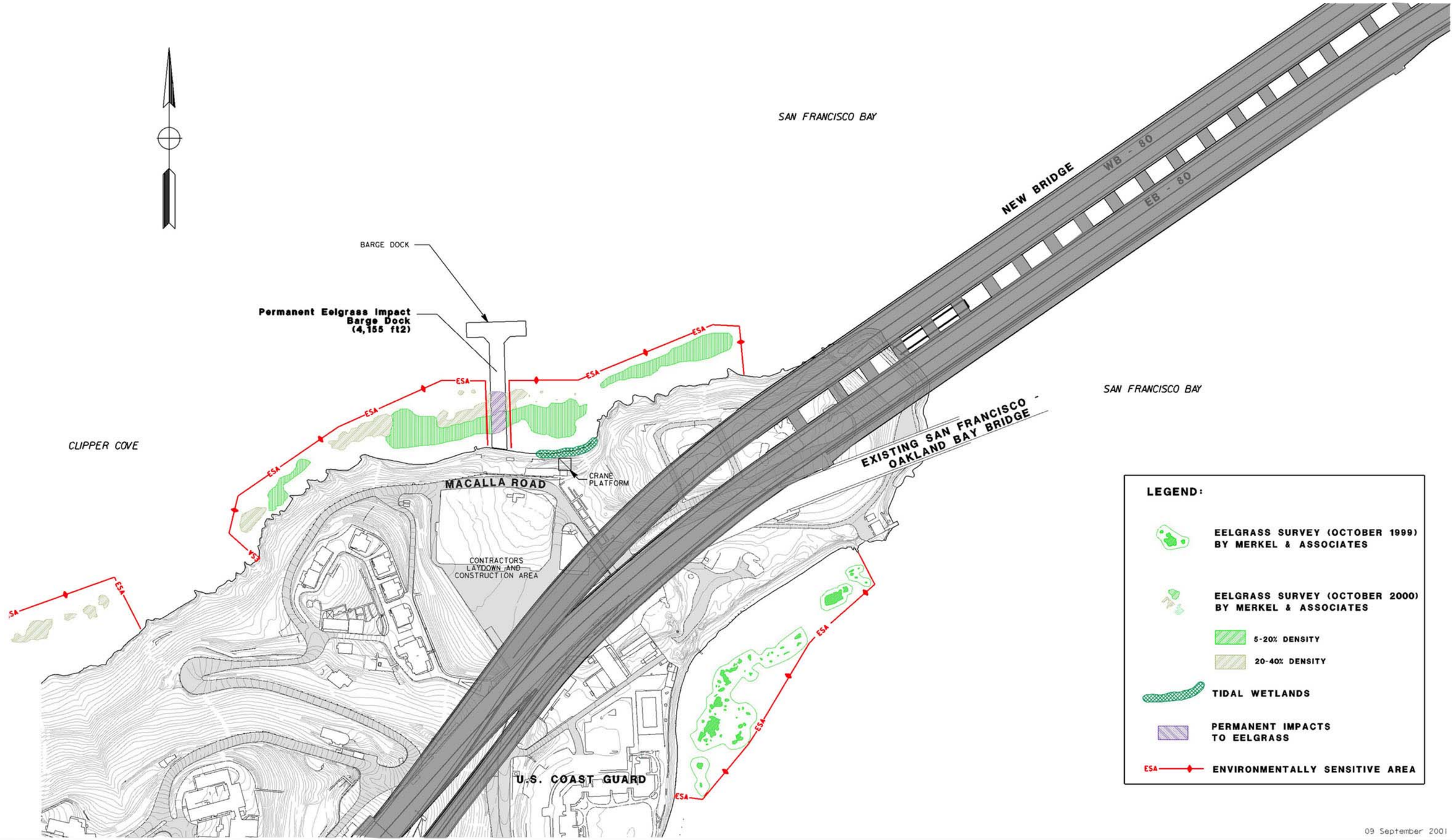
VIEW: LOOKING EAST, NORTH SIDE OF PROPOSED EAST SPAN

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Barge Access Channel at the Oakland Touchdown Area

Not to Scale

Figure 6



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Not to Scale

Impacts Analysis Special Aquatic Sites
Yerba Buena Island

Figure 7

SAN FRANCISCO BAY

RADIO TOWERS

Temporary Impact
Eelgrass
Dredging Turbidity
(15,575 ft2)

Permanent Impact
Eelgrass
Dredging
(137,121 ft2)

Permanent Impact
Sand Flat
Shading from Structures
(17,588 ft2)

Temporary Impact
Sand Flat
Geotube
(22,873 ft2)

STA. 83+17

DREDGING WIDTH TRANSITION

NORTHSIDE LIMIT OF DREDGING FOR BARGE ACCESS CHANNEL

HINGE POINT (TOP OF SLOPE) LIMIT OF DREDGING

TOE OF SLOPE

FALSEWORK (OAKLAND TOUCHDOWN STRUCTURES CONTRACT)

ESA

WB-80

EB-80

NEW BRIDGE

CALTRANS MAINTENANCE ROAD

EXISTING SAN FRANCISCO - OAKLAND BAY BRIDGE

BRIDGE FOOTING (TYPICAL)

CALTRANS MAINTENANCE ROAD (PROPOSED RELOCATION)

BURMA ROAD

Permanent Impact
Sand Flat
WB Roadway Fill
(108,296 ft2)

Temporary Impact
Sand Flat
Key for Rock Slope Protection
(11,819 ft2)

TRESTLE ENVELOPE TO CONTAIN 2 TRESTLES
SKYWAY (75,348 ft2)
OAKLAND APPROACH (150,696 ft2)

Permanent Impact
Sand Flat
Dredging
(50,892 ft2)

Permanent Impact
Sand Flat
Maintenance Road Fill
(5,920 ft2)

N

LEGEND:

- EELGRASS SURVEY (OCTOBER 2000) OAKLAND TOUCHDOWN BY MERKEL & ASSOCIATES
  - 5-20% DENSITY
  - 20-40% DENSITY
  - 40+% DENSITY
- SAND FLATS
- NON-TIDAL WETLANDS
- TEMPORARY IMPACTS TO EELGRASS
- PERMANENT IMPACTS TO EELGRASS
- TEMPORARY IMPACTS TO SAND FLATS
- PERMANENT IMPACTS TO SAND FLATS
- ESA — ENVIRONMENTALLY SENSITIVE AREA

09 September 2001

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Not to Scale

Impacts Analysis Special Aquatic Sites
Oakland Approach

Figure 8