San Francisco – Oakland Bay Bridge
East Span Seismic Safety Project

Draft Environmental Impact Statement/ Statutory Exemption

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SAN FRANCISCO - OAKLAND BAY BRIDGE EAST SPAN SEISMIC SAFETY PROJECT

on Interstate 80 between
Yerba Buena Island and Oakland
in San Francisco and Alameda Counties

DRAFT ENVIRONMENTAL IMPACT STATEMENT/ STATUTORY EXEMPTION

Submitted pursuant to 42 USC 4332 (2)(c) and 49 USC 303

by the

US DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

and

THE STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

In Cooperation with the
UNITED STATES COAST GUARD

Harry Y. Yahata 9/21/98

HARRY Y. YAHATA Date
District Director
District 4
California Department of Transportation

9/21/98

JEFFREY A. LINDLEY Date
Division Administrator
Federal Highway Administration

The following persons may be contacted for additional information concerning this document:

Brian Maroney, Project Manager
East Span Seismic Safety Project
Toll Bridge Program
Caltrans District 4
111 Grand Avenue
P.O. Box 23660
Oakland, CA 94623-0660
(510) 286-5885

John R. Schultz, Chief
District Operations North
Federal Highway Administration
980 Ninth Street, Suite 400
Sacramento, CA 95814-2724
(916) 498-5041

ABSTRACT: Caltrans proposes to ensure a lifeline vehicular connection between Yerba Buena Island in San Francisco and the SFOBB Toll Plaza in Oakland by seismic upgrading of the existing East Span. Alternatives include existing structure retrofit, two replacement alternatives north of the existing bridge, and one replacement alternative to the south. Three bridge main span design variations (cable stayed, self-anchored suspension, and skyway) are being considered. Long-term and temporary impacts include: potential displacement of Caltrans and USCG buildings; change in visual setting; noise; hazardous wastes; water quality; displacement of waters of the U.S. and special aquatic sites; disturbance of special status species habitat; and displacement of archaeological and historic resources. Proposed mitigation measures include: revegetation; consideration of soundwalls; removal of contaminated soils; in-kind replacement of special aquatic sites; treatment plans for archaeological resources; documentation of historic structures; and construction period traffic control measures and Best Management Practices.

Comments on this Draft EIS are due by November 9, 1998, and should be sent to: Mara Melandry, Caltrans District 4, 111 Grand Avenue (P.O. Box 23660), Oakland, California 94623-0660, (510) 286-5582 or by sending e-mail to sfobb.dist04@dot.ca.gov.

PREFACE

This Draft Environmental Impact Statement (EIS) has been prepared pursuant to the requirements of the National Environmental Policy Act (NEPA) by the Federal Highway Administration (FHWA) and the California Department of Transportation (Caltrans), acting as joint lead agencies. The U.S. Coast Guard is a cooperating agency. It evaluates potential impacts of seismic retrofit and replacement alternatives proposed by Caltrans for improving the San Francisco-Oakland Bay Bridge (SFOBB) East Span in order to provide a seismically upgraded bridge over a portion of San Francisco Bay between Yerba Buena Island (YBI) in San Francisco and Oakland. This project is exempt by statute from the requirements of the California Environmental Quality Act (CEQA).

This project is one of several that Caltrans is undertaking to address the overall need to provide a lifeline bridge connection between the cities of San Francisco and Oakland. The other projects include replacing the West Approach in San Francisco, retrofitting the West Span, West YBI Viaduct, and YBI Tunnel, and the interim retrofit on the East Span.

This document is being circulated for a 45-day public review period, during which public hearings will be held on the project. Public and agency comments will be accepted orally and in writing at the public hearings and in writing until the close of the public review period on November 9, 1998. Following receipt and consideration of all public and agency comments on the Draft EIS, Caltrans and FHWA will identify a preferred alternative and a Final EIS will be prepared. The Final EIS will identify the preferred alternative, impacts and mitigation commitments, and will provide a written response to all comments received during the public comment period.

This Draft EIS describes the project purpose and need (Chapter 1), alternatives under consideration and alternatives considered and withdrawn (Chapter 2), affected environment (Chapter 3), project impacts by alternative, and proposed mitigation measures (Chapter 4). Chapter 5 explains the project's exemption from the requirements of CEQA. Chapter 6 provides the Draft Section 4(f) Evaluation. Chapter 7 is an index of key words.

Appendices to this Draft EIS include figures and drawings referenced in the text (Appendix A); qualifications of preparers (Appendix B); a list of recipients of this document (Appendix C); and a glossary of terms and acronyms (Appendix D). Appendices E-G include documentation of consultation and correspondence. The CEQA Statutory Exemption form is in Appendix H. Appendix I is an explanation of relocation assistance provided to residents or businesses displaced by the project; a bibliography is in Appendix J. A description of rock motion anticipated in a seismic event is in Appendix K.

The impacts information presented herein is based upon the following technical studies that have been prepared for the project.

Air Quality Memorandum
Bicycle and Pedestrian Study
Biological Assessment
Community Impact Assessment
Extended Study Report, Archaeological Resources
Finding of Adverse Effect: Built Environment
Finding of Effect for Archaelogical Resources
Hazardous Wastes Assessment
Historic Property Survey Report
Location Hydraulic Study
Natural Environment Study
Noise and Vibration Study
Draft Relocation Impact Report
Traffic Circulation, Access, and Parking Assessment
Visual Impact Assessment

Alternatives addressed in this Draft EIS include replacement bridge alternatives defined through an extensive community involvement process led by the Metropolitan Transportation Commission (MTC). The MTC is a regional governmental agency that provides regional transportation planning and coordination of transportation activities for the nine-county Bay Area. The MTC functions as both the regional transportation planning agency (RTPA), a state designation, and for federal purposes under 23 CFR 134, as the region's metropolitan planning organization (MPO). As such, the MTC is responsible for implementing the Regional Transportation Plan (RTP), which is a comprehensive blueprint for the development of mass transit, highway, airport, seaport, railroad, and bicycle and pedestrian facilities. Requests from local agencies for state and federal grants for transportation projects are screened by the MTC to determine their compatibility with the RTP. The MTC is also the Bay Area Toll Authority, under Section 30950 of the California Streets and Highway Code.

The MTC organized the San Francisco-Oakland Bay Bridge Design Task Force (Task Force) to consider replacement bridge alternatives following Governor Pete Wilson's February 1997 decision that replacement alternatives should be considered. All the members of the Task Force are MTC Commissioners. The Task Force mandate was to develop a consensus recommendation on a design option for a new eastern span of the SFOBB and recommend any additional features that might be included in the design of the bridge that would not be borne by funding allocated from the State of California. The additional features would be paid by Bay Area bridge users through a toll surcharge at the state-owned toll bridges.

The MTC Task Force formed an Engineering and Design Advisory Panel (EDAP) to advise the Task Force on issues of cost, engineering feasibility, design factors, and seismic safety. The EDAP is comprised of technical experts in structural and civil engineering and architecture. EDAP deliberations included meetings and workshops open to the public for presentation of design concepts from interested parties. Beginning with the first of four formal public hearings on March 27, 1997, the Task Force has considered replacement bridge options (e.g., different types of replacement bridge structures) and the cost and feasibility of including design features such as "signature" bridge structures and a pedestrian/bicycle path.

The Task Force made its summary recommendations to Caltrans on July 30, 1997, concerning replacement bridge types, alignment, and a request for additional analysis needed to determine cost and feasibility of design components and features. Recommendations of the Task Force were transmitted to Caltrans and the State Legislature to assist in the determination of potential funding needs for the project.

In response to Task Force recommendations, Caltrans initiated the requested preliminary design studies. The 30 percent design studies were used to determine the seismic performance, cost, and aesthetics of the bridge types recommended for further study by the Task Force. The EDAP reviewed results of design studies in a series of public meetings and made specific recommendations to the Task Force (see Appendix E: Consultation and Coordination). On June 24, 1998, following extensive public comment, the Task Force forwarded an advisory recommendation to MTC that the replacement structure be a concrete skyway structure with an asymmetrical self-anchored suspension main span supported by a single steel tower. A 4.7-meter (15.5-foot) wide pedestrian/bicycle path 0.3 meter (one foot) higher than the traffic lanes located on the south side of the eastbound structure was also recommended and accepted by the MTC.

Alternative N-6, self-anchored suspension design variation, analyzed in this Draft EIS matches the bridge type recommendation defined through the Task Force proceedings. Although this alternative represents the bridge type recommendation of the MTC Task Force, it is not designated as a Recommended or Preferred Alternative in the Draft EIS. The Task Force recommendation is considered advisory and represents the locally preferred option. Caltrans and the FHWA have considered and performed preliminary engineering on a range of possible project alternatives in accordance with NEPA requirements and in consultation with permitting and regulatory agencies. Five alternatives (No-Build, Retrofit Existing Structure, two northern alignments, and one southern alignment) are currently under consideration for the East Span Project. Caltrans and the FHWA will identify a preferred alternative following circulation of this Draft EIS and consideration of public and agency comments on the document.

Copies of the Draft EIS and technical studies are available for public review at the following locations:[1]

Caltrans Public Information Office
111 Grand Avenue
Oakland, CA 94612-3006
(510) 286-4444

Contra Costa County Library
1750 Oakpark Boulevard
Pleasant Hill, CA 94526
(925) 646-6434

[1] Because the Extended Study Report, Archaeological Resources and Finding of Effect for Archaeological Resources Report contain confidential information about the locations of archaeological resources, they are not available for review.

Metropolitan Transportation Commission/Association of Bay Area Governments Library
101 Eighth Street
Oakland, CA 94607
(510) 464-7700

Oakland Main Library
125 14th Street
Oakland, CA 94612
(510) 238-3134

San Francisco Main Library
100 Larkin Street
San Francisco, CA 94102
(415) 557-4400

John F. Kennedy Library
505 Santa Clara Street
Vallejo, CA 94590
(707) 553-5568

The Draft EIS can also be found on the internet at the following website address: www.dot.ca.gov/dist4.

Caltrans can be contacted by e-mail at sfobb.dist04@dot.ca.gov.

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SUMMARY

The California Department of Transportation (Caltrans) proposes to retrofit or replace the San Francisco-Oakland Bay Bridge (SFOBB) East Span, which has carried vehicles between Yerba Buena Island (YBI) and Oakland since 1936. The East Span is a double-deck structure 3,696 meters (12,127 feet) in length carrying five traffic lanes in each direction, east- and westbound.

This Draft Environmental Impact Statement (EIS) has been prepared by Caltrans and the Federal Highway Administration (FHWA) pursuant to the National Environmental Policy Act (NEPA) to analyze potential environmental and socioeconomic impacts of several possible replacement bridge alternatives, as well as retrofit of the existing structure and no-build alternatives. The project is exempt by statute from the provisions of the California Environmental Quality Act (CEQA). The U.S. Coast Guard (USCG) is a cooperating agency.

S.1 PROJECT VICINITY AND PROJECT LIMITS

Alternatives analyzed in this Draft EIS would seismically retrofit or replace the East Span, involving construction activities and physical changes on both ends of the span and within the Bay. The west end of the project area is located west of the tunnel on YBI within the City and County of San Francisco (CCSF), and the east end of the project area is located in the City of Oakland, Alameda County. The project study area includes San Francisco Bay waters adjacent to the bridge in which construction activities might occur. In addition, Bay waters on the north side of YBI are included within the project area to allow staging for large construction equipment and bulk materials to be delivered to YBI by barge or vessel.

S.2 PURPOSE OF AND NEED FOR THE PROJECT

The SFOBB is an important part of the Bay Area as it provides regional access between the San Francisco Peninsula and the East Bay. Approximately 350,000 people in 274,000 vehicles currently use the bridge each day. As a component of Interstate 80 (I-80), it is also a critical link in the interstate network.

The purpose of the East Span Project is to provide a seismically upgraded vehicular crossing for current and future users between YBI and Oakland. This project is one of several that Caltrans is undertaking to address the overall need to provide a lifeline bridge connection on SFOBB between the cities of San Francisco and Oakland. The other projects include replacing the west approach in San Francisco, retrofitting the West Span, West YBI Viaduct, and YBI tunnel, and the interim retrofit on the East Span.

The existing East Span must be replaced or retrofitted because: it is not expected to withstand a maximum credible earthquake (MCE) on the San Andreas fault (an earthquake of magnitude 8 on the Richter scale) or Hayward fault (an earthquake of magnitude 7 1/4); it does not meet "lifeline" criteria for providing emergency relief access following an MCE; and, it does not meet current operations and safety design standards.

The Retrofit Existing Structure Alternative and the replacement alternatives would meet the project purpose and need to varying degrees. All replacement alternatives would fulfill the project purpose and address the need to provide a lifeline connection between the East Bay and Yerba Buena and Treasure Islands, to enable the East Span to withstand an MCE, and to satisfy current operational and safety standards. The Retrofit Existing Structure Alternative would retrofit the existing bridge to withstand an MCE, but the bridge would most likely experience substantial damage. The Retrofit Existing Structure Alternative would not permit changes to the existing bridge; therefore, current design standards could not be attained. The No-Build Alternative does not satisfy the project purpose and need.

S.3 PROJECT DESCRIPTION

Twelve alternatives, in addition to the No-Build Alternative, were considered during the scoping phase of this project. Four alternatives plus the No-Build Alternative were carried forward for the detailed analysis in this EIS, as described below. The project alternatives are shown on Figure S-1.

S.3.1 No-Build Alternative

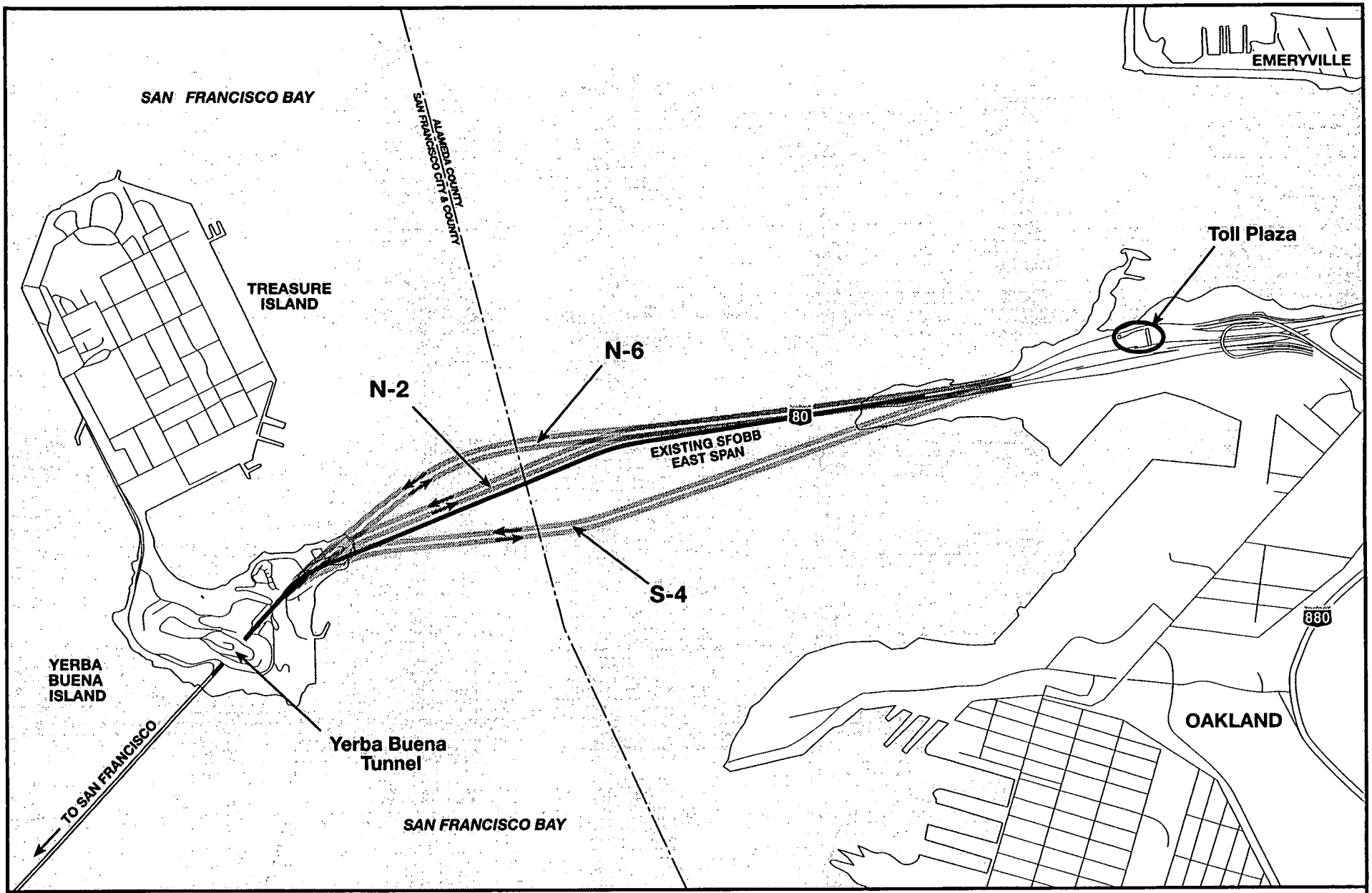
The No-Build Alternative would retain the existing SFOBB East Span. The No-Build Alternative assumes that the interim retrofitting of the East Span has been completed as a prior project. The Interim Retrofit Project is currently under way to strengthen bents and columns on the viaduct section on YBI and strengthen piers, bents, and trusses at selected locations on the structure, so that the existing East Span would be able to withstand a moderate earthquake. This work is expected to be completed by late 1998. The No-Build Alternative is evaluated primarily as a basis for comparison with the build alternatives.

S.3.2 Retrofit Existing Structure Alternative

The Retrofit Existing Structure Alternative would seismically retrofit and rehabilitate the existing East Span to withstand an MCE. The alignment of the bridge would remain unchanged. Improvements would be made to the existing structure and the East YBI Viaduct. These improvements would strengthen the substructure and modify the superstructure to permit large displacements at specified joints. In addition, two new piers would be added to the cantilever main span to provide additional support.

S.3.3 Alternative N-2

Replacement Alternative N-2 would construct a new bridge (two side-by-side bridge decks, each deck consisting of five lanes) north of the existing alignment and would dismantle the existing structure. The alignment 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



SFOBB EAST SPAN SEISMIC SAFETY PROJECT

GRAPHIC SCALE 1:27,500

0 250 500 1000 m

Project Alternatives

Figure S-1

PBQ&D F-231 9/8/98

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. Alternative N-2 would include a pedestrian/bicycle path on the south side of the eastbound structure. The path would be 4.7-meter (15.5-foot) wide and 0.3 meter (1 foot) higher than adjacent traffic lanes.

S.3.4 Alternative N-6

Replacement Alternative N-6 is similar to N-2, but the proposed bridge would be aligned north of the existing structure and Alignment Alternative N-2. This alignment has been designed to maximize views to the north of YBI while minimizing intrusion into portions of the Bay where geologic conditions increase the complexity and cost of constructing bridge piers. The overall length of 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. Alternative N-6 would include a pedestrian/bicycle path on the south side of the eastbound structure. The path would be 4.7-meter (15.5-foot) wide and 0.3 meter (1 foot) higher than adjacent traffic lanes.

S.3.5 Alternative S-4

Replacement Alternative S-4 would be located south of the existing East Span. The alignment would exit the YBI Tunnel on a double-deck viaduct and transition to two parallel structures. 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. Alternative S-4 has been developed to avoid conflicts with the alignment of the existing East Bay Municipal Utility District (EBMUD) sewer outfall, which parallels the existing East Span to the south. Alternative S-4 would include a pedestrian/bicycle path on the south side of the eastbound structure. The path would be 4.7-meter (15.5-foot) wide and 0.3 meter (1 foot) higher than adjacent traffic lanes.

S.3.6 Design Variations

Design variations for main span type have been identified for consideration with each of the replacement alternatives. The span type variations include a cable stayed design, a self-anchored suspension design and a skyway design. Attributes and costs (2002 dollars) associated with each design variation are shown in Table S-1.

Table S-1 Replacement Bridge Design Variations

Bridge Design Variations	Months to Construct	Cost to Construct (in $ billions)
Cable-stayed	60	1.45 - 1.57
Self-anchored	60	1.46 - 1.65
Skyway	60	1.35 - 1.40

Source: Parsons Brinckerhoff, September 1998

S.3.7 Accommodation of Multi-Modal Strategies

While none of the project alternatives presented above would include facilities for high occupancy vehicle (HOV) lanes or rail transit, the existing East Span or a replacement span could accommodate a HOV lane or light rail transit (LRT) by converting vehicular traffic lanes or shoulders and making additional modifications. BART- or AMTRAK-type trains could not be accommodated on the East Span structure due to the combined length and weight of the trains. The purpose of such a facility would be to increase mobility within the Transbay Corridor.

The feasibility of incorporating a high occupancy transportation facility was evaluated as part of the East Span Project alternatives definition process. The evaluation determined that the implementation of a multi-modal strategy would have institutional and funding issues and adversely affect traffic operations on the SFOBB and its approaches. LRT strategies have not been evaluated at a system level, and no funding has been programmed or identified for either HOV lanes or LRT.

Since multi-modal strategies would reduce the number of mixed-flow traffic lanes, any multi-modal strategy must capture high ridership to match the loss in mixed-flow vehicular capacity on the SFOBB and its approaches. Otherwise, vehicular operations on the SFOBB and approaches would be comparatively worse than without the system. Substantial costs would be incurred to construct and operate an HOV or LRT system. Based on these potential impacts, neither dedicated HOV lanes nor an LRT system has been included in project alternatives.

The implementation of any multi-modal strategy on the SFOBB would be subject to independent evaluation and funding as a separate project in the future. The SFOBB East Span project does not preclude the implementation of an HOV lane or a rail system on the East Span in the future.

S.3.8 Alternatives Considered but Withdrawn

In addition to the alternatives considered above, Caltrans considered other project alternatives which were ultimately withdrawn from further consideration. These alternatives included the following: four northern alignments and three southern alignments for a replacement bridge with two side-by-side decks and a double-deck structure for either a northern or a southern alignment.

These alternatives were rejected for a variety of reasons, as described in Section 2.7. Important considerations that contributed to rejection or withdrawal of alternatives included limitations on panoramic views, geologic conditions (deep Bay muds and distance to bedrock), not being able to meet American Association of State Highway and Transportation Officials (AASHTO) design standards, less than optimal roadway geometry, conflicts with the EBMUD sewer outfall, and constructablilty issues for the detour structures.

S.3.9 Design Variations Considered But Withdrawn

Replacement refinement studies evaluated variations for the bridge profile, which refers to the rise in roadway elevation from the Oakland Touchdown area to the YBI East Viaduct connection. A Constant Grade profile has been used in this analysis, although general preference was stated by the MTC Bay Bridge Design Task Force Engineering and Design Advisory Panel (EDAP) for the Elevated Grade profile variation The Constant Grade profile proved to be more cost effective than the Elevated Profile, while having a negative visual effect on the perception of the main span from a distance.

Two possibilities for the main span towers for the cable-stayed and self-anchored suspension design variations were examined. Following an evaluation of seismic safety, construction requirements, aesthetic considerations, and potential environmental impacts, the single-tower main span design option was recommended by the EDAP and a dual-tower option was withdrawn from further consideration.

Bicycle/pedestrian path options were considered by a Caltrans-hosted Bicycle/Pedestrian Advisory Committee. The committee considered replacement alternative design variations including a single path on one structure and dual paths, one on each structure. Caltrans also analyzed replacement alternatives without a path.

Based on recommendations of the committee and the approval by MTC to use toll revenues to fund a path, a single 4.7-meter (15.5-foot) wide path elevated 0.3 meter (1 foot) above the adjacent travel lanes has been added to the design of the eastbound structure in the N-2, N-6 and S-4 Replacement Alternatives.

S.4 ENVIRONMENTAL AND SOCIOECONOMIC IMPACTS AND PROPOSED MITIGATION MEASURES

The No-Build Alternative would not implement any project-related improvements and would therefore have no direct impacts. The existing bridge would continue to be vulnerable to damage in a major seismic event.

The Retrofit Existing Structure Alternative and all of the replacement alternatives would have some long-term (permanent) and short-term (construction-related) impacts on the physical and socioeconomic environment of the project study area.

Summary of Impacts

Table S-3 (at the end of this chapter) provides a summary of the environmental effects of the project alternatives and proposed mitigation measures.

S.5 CONSULTATION AND COORDINATION

The FHWA and Caltrans are serving as joint lead agencies to prepare this Environmental Impact Statement/Statutory Exemption (CEQA). The U.S. Coast Guard is a cooperating agency.

This environmental document was prepared in consultation and coordination with various federal, state, and local agencies and organizations. Notable consultation and coordination activities are summarized below.

S.5.1 Project Organization and Committees

Several groups have been organized to advise the decision-makers for the East Span Project. Table S-2 lists the groups and their roles.

Table S-2 Project Advisory Groups

Group	Role
Project Development Team (PDT) (Comprised of 31 local, state, and federal agencies; elected officials; special service districts; and professional organizations)	Serves as the technical advisory committee to Caltrans decision-makers. Meets periodically to address project issues, requiring technical direction or resolution.
Metropolitan Transportation Commission Bay Bridge Design Task Force	Coordinates local deliberations for the location, design and potential funding strategies for a replacement structure.
MTC Bay Bridge Design Task Force Engineering and Design Advisory Panel (EDAP) (Comprised of technical experts in structural and civil engineering, seismicity and geology, and architecture)	Provides expert technical analysis and recommendations to the Task Force.
Bicycle/Pedestrian Advisory Committee (BPAC) (Comprised of key members from ad-hoc bicycle, alternative transit, and public access groups)	Represents the interest of the numerous groups advocating installation of a pedestrian/bicycle path in replacement alternatives.
Oakland Gateway Joint Planning Group (Comprised of the East Bay Regional Park District, San Francisco Bay Conservation and Development Commission, Port of Oakland, City of Oakland, Oakland Landmarks Preservation Advisory Board, Oakland Army Base Reuse Authority, National Park Service and the Association of Bay Area Governments/Bay Trail, Caltrans staff, project consultants, and the U.S. Navy)	Coordinates efforts to establish a shoreline park in the Oakland Touchdown area.

S.5.2 Key Agency Meetings

NEPA/404 Integration Memorandum of Understanding (MOU) Process

Since August 1997, consultation has been ongoing with federal agencies, under the western states Memorandum of Understanding (MOU) for integrated NEPA/404 processing. 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) have been asked to concur on the project purpose and need statement, criteria for alternative selection and range of alternatives to be considered. Three meetings have been conducted to date under the MOU process. At those meetings, participants considered the seismic safety-based project purpose and need statement and the range of alternatives proposed for evaluation. Following the meetings, written concurrence was received from each signatory agency. (Letters are presented in Appendix F.)

Other federal, state, and regional agencies with regulatory and permitting obligations for the East Span Project were invited to participate in the NEPA/404 MOU meetings. These include:

- U.S. Coast Guard (Cooperating Agency)
- San Francisco Regional Water Quality Control Board
- San Francisco Bay Conservation and Development Commission
- U.S. Army
- California Department of Fish and Game
- Metropolitan Transportation Commission

Coordination Pursuant to Section 106 of the National Historic Preservation Act

In April 1997, several organizations were invited to submit comments on the East Span Project with respect to historic properties. These organizations included:

- American Society of Civil Engineers, History and Heritage Committee
- Berkeley Architectural Heritage Association
- California Preservation Foundation
- Foundation for San Francisco's Architectural Heritage
- National Trust for Historic Preservation, Western Regional Office
- Oakland Heritage Alliance
- Oakland Landmarks Preservation Advisory Board
- San Francisco Landmarks Preservation Advisory Board

In July 1997, Caltrans gave a brief presentation on the East Span Project to representatives of the Oakland Landmarks Preservation Advisory Board, Oakland Heritage Alliance, California Preservation Foundation, and San Francisco Landmarks Preservation Advisory Board. The Oakland Landmarks Preservation Advisory Board responded by letter on January 14, 1998, advocating that consideration be given to retrofit of the existing bridge rather than replacement and suggesting several mitigation measures if a replacement alternative is selected.

Since then, Caltrans and the Oakland LPAB have continued to coordinate regarding potential mitigation measures and other historic preservation issues associated with the East Span Project.

Outreach Meetings with the City of Oakland and City and County of San Francisco

Frequent meetings have been held with agency directors, planning officials, and others with the City of Oakland and the CCSF to discuss potential benefits and impacts of the project to each of the municipalities. Key concerns for the City of Oakland are the aesthetic qualities of the East Span and the Oakland Touchdown area, rail, and mitigation for impacts to the historic qualities of the existing East Span. Key concerns for the CCSF include the alignment alternatives, land use on YBI, and impacts to access ramps to and from YBI and Treasure Island.

S.5.3 Community Involvement

During the preparation of this EIS, a variety of public participation activities have been conducted over the course of the engineering and environmental studies. The public has been encouraged to participate in the process by asking questions and making comments. Public involvement activities have included scoping meetings, environmental stakeholders meetings, open houses in Alameda, Contra Costa, San Francisco, and Solano counties, presentations to organized groups, and quarterly newsletters to over 3,500 interested parties. A total of 45 presentations were made to various public groups, agencies, and professional associations over the course of the project.

S.6 UNRESOLVED ISSUES AND AREAS OF CONTROVERSY

Issues of potential controversy associated with the East Span Project include accommodation of rail service on the bridge, disposal of dredged materials, future land use scenarios on YBI, and access ramps to and from YBI. The following is a summary of each issue:

Rail Service

The provision of adequate right-of-way to accommodate rail service on the replacement alternatives is an issue raised by some East Bay communities and the City and County of San Francisco. Although the fundamental obstacles to implementing rail service on the SFOBB as part of this project are discussed in this document, it is likely that additional public discussion of rail service on the SFOBB in the larger Transbay Corridor will continue.

Dredged Materials Disposal

Disposal of dredged materials at in-Bay or upland locations will be determined during the permitting stage of the project, which will occur in Summer 1999, after preparation of the Final EIS. It is anticipated by Caltrans that a portion of the dredged materials will be approved for disposal at an in-Bay location, since the Dredged Materials Management Office had granted conceptual approval for disposal of the dredge volumes associated with the Retrofit Existing Structure Alternative.

YBI Land Use

Potential land use impacts on YBI resulting from replacement alternatives are based on tentative information included in the TI/YBI Re-use Plan. Additional refinement of this issue will be required as the final design plans for the identified preferred alternative are developed and as land use planning decisions for YBI are made.

YBI Access Ramps

While not a component of the SFOBB East Span Seismic Retrofit Project, the ultimate ownership, redesign, and funding of new ramps on YBI is the subject of continuing discussion between Caltrans and the City and County of San Francisco. Caltrans does not currently own the ramps.

S.7 APPROVALS REQUIRED

Required approvals are listed in a table at the end of Appendix E.

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

Impact Category	Retrofit Existing Structure Alternative	Replacement Alternative N-2	Replacement Alternative N-6	Replacement Alternative S-4
Socioeconomic/ Land Use	A beneficial impact on employment by generating direct and indirect jobs. No impacts were identified to community services. No Environmental Justice impacts. No impacts on existing land uses in the project area. No conflicts with reuse plans.	A beneficial impact on employment by generating direct and indirect jobs. No impacts were identified to community services. No Environmental Justice impacts. No long-term impacts to existing land uses on YBI. About 0.2 hectare (0.5 acre) of City of Oakland-designated "Resource Conservation" Area required. Coordinate with the Oakland Gateway Joint Planning Group to enhance public access opportunities in the Oakland Touchdown area. Relocation of USCG access road would require removal of Buildings 40, 75, and 270. Caltrans would remove the facilities and provide reasonable compensation or relocate structures. Redevelopment potential would be restricted on the eastern end of YBI due to the presence of footings and piers. Should this alternative be identified as the preferred alternative, Caltrans will coordinate with the CCSF to minimize the amount of land required for footings and columns. Would require ongoing joint planning among BCDC, City and Port of	A beneficial impact on employment by generating direct and indirect jobs. No impacts were identified to community services. No Environmental Justice impacts. About 0.2 hectare (0.5 acre) of City of Oakland-designated "Resource Conservation" Area required. Coordinate with the Oakland Gateway Joint Planning Group to enhance public access opportunities in the Oakland Touchdown area. Relocation of USCG access road would require removal of Buildings 40, 75, and 270. Caltrans would remove the facilities and provide reasonable compensation or relocate structures. Redevelopment potential would be restricted on the eastern end of YBI due to the presence of footings and piers. Should this alternative be identified as the preferred alternative, Caltrans will coordinate with the CCSF to minimize the amount of land required for footings and columns. Would require ongoing joint planning among BCDC, City and Port of Oakland, and EBRPD to implement Caltrans' BCDC Bay access permit conditions. Coordinate with BCDC to	A beneficial impact on employment by generating direct and indirect jobs. No impacts were identified to community services. No Environmental Justice impacts. Location of a pier on the USCG complex would impact USCG Building 40 on YBI. Caltrans would remove the building and provide reasonable compensation; relocate the structure, or change the locations of footings and support piers to avoid Building 40. Would affect the southeastern corner of the EBMUD dechlorination facility at the Oakland Touchdown. The facility would be relocated or this alternative, if selected, would be redesigned to avoid the facility. Beneficial impact to redevelopment on YBI as the existing bridge would be removed and the area for redevelopment would be increased. Would occupy a portion of the first 450 meters (500 yards) of the Oakland Army Base vacant land south of the existing East Span.

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

Impact Category	Retrofit Existing Structure Alternative	Replacement Alternative N-2	Replacement Alternative N-6	Replacement Alternative S-4
		Oakland, and EBRPD to implement Caltrans' BCDC Bay access permit conditions. Coordinate with BCDC to determine necessary Bay access modifications or requirements. Would contribute to assembly of large developable space to the south of the alignment. Beneficial impact on cooperative park development at Oakland Touchdown area.	determine necessary Bay access modifications or requirements. Would contribute to assembly of large developable space to the south of the alignment. Beneficial impact on cooperative park development at Oakland Touchdown area.	Would impede the ability of the Port of Oakland to develop and expand existing facilities in the Oakland Touchdown area. Coordinate with the Port and other agencies in developing reuse concepts. Would require ongoing joint planning among BCDC, City and Port of Oakland, and EBRPD to implement Caltrans' BCDC Bay access permit conditions. Coordinate with BCDC to determine necessary Bay access modifications or requirements. Would contribute to assembly of a large contiguous north-facing parcel for park development at Oakland Touchdown.
Transportation	No long-term circulation, access, parking, or marine traffic impacts. Would not accommodate a pedestrian/bicycle path and, as such, would not support the goals of the Treasure Island Reuse Plan, the City of Oakland Pedestrian and Bicycle Master Plan, and the Bay Trail Plan. Continue to provide SFOBB bicycle shuttle.	Narrowing the southern edge of Macalla Road on YBI to make room for two bridge columns would conflict with the turning movements of large vehicles. Macalla Road would be widened to the north. Three columns may potentially block the existing USCG Station entrance road on YBI. Relocate the existing entrance road. No impact on existing or planned bicycle traffic on YBI or the Oakland Touchdown area.	Narrowing the southern edge of Macalla Road on YBI to make room for two bridge columns would conflict with the turning movements of large vehicles. Macalla Road would be widened to the north. One column may potentially block the existing USCG Station entrance road on YBI. Convert the temporary entrance into the permanent entrance or relocate the existing entrance road slightly.	Narrowing the southern edge of Macalla Road on YBI to make room for two bridge columns would conflict with the turning movements of large vehicles. Macalla Road would be widened to the north. No impact on existing or planned bicycle traffic on YBI or the Oakland Touchdown area.

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

Impact Category	Retrofit Existing Structure Alternative	Replacement Alternative N-2	Replacement Alternative N-6	Replacement Alternative S-4
		A pedestrian stairway on YBI linking the USCG Station and Quarters 1-8 housing to Treasure Island Rd. would be displaced. The stairway would be rebuilt. Pedestrian/Bicycle path would support the goals of all pedestrian/bicycle plans. No long-term parking or marine traffic impacts. Tower design variations would change existing obstruction markings and lighting. Warning lights would mark top of tower. Notify FAA upon selection of preferred alternative. Both eastbound and westbound replacement bridge decks would be visible to traffic on the opposite deck. Traffic incidents on one deck could potentially affect traffic on the other deck.	No impact on existing or planned bicycle traffic on YBI or the Oakland Touchdown area. A pedestrian stairway on YBI linking the USCG Station and Quarters 1-8 housing with Treasure Island Rd. would be displaced. The stairway would be rebuilt. Pedestrian/Bicycle path would support the goals of all pedestrian/bicycle plans. No long-term parking or marine traffic impacts. Tower design variations would change existing obstruction markings and lighting. Warning lights would mark top of tower. Notify upon selection of preferred alternative. Both eastbound and westbound replacement bridge decks would be visible to traffic on the opposite deck. Traffic incidents on one deck could potentially affect traffic on the other deck.	Pedestrian/Bicycle path would support the goals of all pedestrian/bicycle plans. No long-term parking or traffic impacts. Tower design variations would change existing obstruction markings and lighting. Warning lights would mark top of tower. Notify FAA upon selection of preferred alternative. Realignment of Burma Rd. and Caltrans maintenance road at the Oakland Touchdown. No impacts associated with change in access. Both eastbound and westbound replacement bridge decks would be visible to traffic on the opposite deck. Traffic incidents on one deck could potentially affect traffic on the other deck.
Visual/Aesthetics	No impact.	Construction of replacement span would require removal of substantial amounts of woodland vegetation from YBI, constituting a visual impact. **Mitigation**—Pre-	Construction of replacement span would require removal of substantial amounts of woodland vegetation from YBI, constituting a visual impact. **Mitigation**—Pre-construction	Construction of replacement span would require removal of substantial amounts of woodland vegetation from YBI, constituting a visual impact. **Mitigation**—Pre-

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

Impact Category	Retrofit Existing Structure Alternative	Replacement Alternative N-2	Replacement Alternative N-6	Replacement Alternative S-4
		construction documentation of species type, number and distribution. Develop a master planting plan in cooperation with local agencies. Construction of replacement span would require the removal of a number of trees within the project's construction limit on the Oakland Touchdown area. **Mitigation—** Develop a master planting plan in cooperation with local city agencies.	documentation of species type, number and distribution. Develop a master planting plan in cooperation with local agencies.	construction documentation of species type, number and distribution. Develop a master planting plan in cooperation with local agencies.
Air Quality	No long-term impacts. Impacts primarily during construction (see construction below).	No long-term impacts. Impacts primarily during construction (see construction below).	No long-term impacts. Impacts primarily during construction (see construction below).	No long-term impacts. Impacts primarily during construction (see construction below).
Noise and Vibration	No change from existing noise levels. Peak-noise levels would exceed Noise Abatement Criteria at sensitive land uses. **Mitigation—** Caltrans will work with the Navy and USCG re noise abatement approaches on YBI that would not restrict views of bridge users or detract from bridge aesthetics. Feasibility of mitigation measures will be determined during final design of the identified preferred alternative.	Peak-noise levels would exceed Noise Abatement Criteria at sensitive land uses, but would generally be less than existing traffic noise levels. **Mitigation—** Caltrans will work with the Navy and USCG re noise abatement approaches on YBI that would not restrict views of bridge users nor detract from bridge aesthetics. The feasibility of mitigation measures will be determined during final design of the identified preferred alternative.	Peak-noise levels would exceed Noise Abatement Criteria at sensitive land uses, but would generally be less than existing traffic noise levels. **Mitigation—** Caltrans will work with the Navy and USCG re noise abatement approaches on YBI that would not restrict views of bridge users nor detract from bridge aesthetics. The feasibility of mitigation measures will be determined during final design of the identified preferred alternative.	Peak- noise levels would exceed Noise Abatement Criteria at sensitive land uses, but would generally be less than existing traffic noise levels. **Mitigation—** Caltrans will work with the Navy and USCG re noise abatement approaches on YBI that would not restrict views of bridge users nor detract from bridge aesthetics. The feasibility of mitigation measures will be determined during final design of the identified preferred alternative.

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

Impact Category	Retrofit Existing Structure Alternative	Replacement Alternative N-2	Replacement Alternative N-6	Replacement Alternative S-4
Hazardous Wastes	No long-term impacts. Potential hazardous sites have been identified. Impacts primarily during construction (see construction below).	No long-term impacts. Potential hazardous sites have been identified. Impacts primarily during construction (see construction below).	No long-term impacts. Potential hazardous sites have been identified. Impacts primarily during construction (see construction below).	No long-term impacts. Potential hazardous sites have been identified. Impacts primarily during construction (see construction below).
Geology, Soils, and Seismicity	No impacts.	Several slope stability-related issues could be associated with design of the land and marine tower foundations in the vicinity of YBI. These issues include: the gross stability of the east-facing slope of YBI, the temporary stability of the cut for the main tower (cable-supported variations), and the potential for slope failures in the vicinity of the west foundation for the main span. Slope stability issues can be addressed during final design of the selected preferred alternative. Potential for liquefaction, settlement, and lateral displacement damage to Oakland Touchdown area bridge embankments. Design to reduce the risk of effects of liquefaction, settlement, and lateral spreading. Moderate to severe potential for structural distress of bridges, retaining walls, and culverts. Design to site-specific soil conditions and potential geologic hazards.	Several slope stability-related issues could be associated with design of the land and marine tower foundations in the vicinity of YBI. These issues include: the gross stability of the east-facing slope of YBI, the temporary stability of the cut for the main tower (cable-supported variations), and the potential for slope failures in the vicinity of the west foundation for the main span. Slope stability issues can be addressed during final design of the selected preferred alternative. Potential for liquefaction, settlement, and lateral displacement damage to Oakland Touchdown area bridge embankments. Design to reduce the risk of effects of liquefaction, settlement, and lateral spreading. Moderate to severe potential for structural distress of bridges, retaining walls, and culverts. Design to site-specific soil conditions and potential geologic hazards.	Several slope stability-related issues could be associated with design of the land and marine tower foundations in the vicinity of YBI. These issues include: the gross stability of the east-facing slope of YBI, the temporary stability of the cut for the main tower (cable-supported variations), and the potential for slope failures in the vicinity of the west foundation for the main span. Slope stability issues can be addressed during final design of the selected preferred alternative. Potential for liquefaction, settlement, and lateral displacement damage to Oakland Touchdown area bridge embankments. Design to reduce the risk of effects of liquefaction, settlement, and lateral spreading. Moderate to severe potential for structural distress of bridges, retaining walls, and culverts.

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

Impact Category	Retrofit Existing Structure Alternative	Replacement Alternative N-2	Replacement Alternative N-6	Replacement Alternative S-4
		The Oakland Touchdown area would be subject to inundation from a 200-year-return-period tsunami. The structural design of the alternative would include the capability of resisting water/wave/current-induced loading.	The Oakland Touchdown area would be subject to inundation from a 200-year-return-period tsunami. The structural design of the alternative would include the capability of resisting water/wave/current-induced loading.	Design to site-specific soil conditions and potential geologic hazards. The Oakland Touchdown area would be subject to inundation from a 200-year-return-period tsunami. The structural design of the alternative would include the capability of resisting water/wave/current-induced loading.
Water Quality	Develop a Storm Water Pollution Prevention Plan during the design process to address all construction management practices that have the potential to impact water quality and would identify appropriate control measures to be taken by the contractor to minimize such potential impacts.	Potential impact due to incremental impervious surfaces and storm water runoff. Consider permanent control measures (PCMs) in project design to control and minimize the discharge of pollutants to the Bay to the extent practicable. Develop a Storm Water Pollution Prevention Plan during the design process to address all construction management practices that have the potential to impact water quality and identify appropriate control measures to be taken by the contractor to minimize such potential impacts. Expected reductions in paint removal and painting efforts and improved emergency response compared to existing conditions would result in beneficial effects on water quality.	Potential impact due to incremental impervious surfaces and storm water runoff. Consider permanent control measures (PCMs) in project design to control and minimize the discharge of pollutants to the Bay to the extent practicable. Develop a Storm Water Pollution Prevention Plan during the design process to address all construction management practices that have the potential to impact water quality and identify appropriate control measures to be taken by the contractor to minimize such potential impacts. Expected reductions in paint removal and painting efforts and improved emergency response compared to existing conditions would result in beneficial effects on water quality.	Potential impact due to incremental impervious surfaces and storm water runoff. Consider permanent control measures (PCMs) in project design to control and minimize the discharge of pollutants to the Bay to the extent practicable. Develop a Storm Water Pollution Prevention Plan during the design process to address all construction management practices that have the potential to impact water quality and identify appropriate control measures to be taken by the contractor to minimize such potential impacts. Expected reductions in paint removal and painting efforts and improved emergency response compared to existing conditions would result in beneficial effects on water quality.

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

Impact Category	Retrofit Existing Structure Alternative	Replacement Alternative N-2	Replacement Alternative N-6	Replacement Alternative S-4
Natural Resources	Placement of 54,100 m^3 (1,910,500 $ft.^3$) of fill in Bay. Consultation with the ACOE and BCDC would occur to ensure the appropriate permits are obtained.	Placement of 14,800 m^3 (522,700 $ft.^3$) to 20,300 m^3 (716,900 $ft.^3$) of fill in Bay. Removal of existing span results in net reduction of bay fill. Realignment of Burma Road would result in loss of 0.03 hectare (0.07 acre) of non-tidal wetland on south side of Oakland Touchdown area. **Mitigation**—Loss of jurisdictional wetlands will be mitigated at a mitigation ratio of 3:1, by the creation of new wetland habitat or enhancement of existing wetlands within the project area. N-2 would result in the loss of 0.12 hectare (0.3 acre) of mudflats on the north side of the Oakland Touchdown. **Mitigation**—A conceptual mitigation plan will be developed for the replacement of mudflats at a ratio of 3:1. N-2 would result in removal of 0.25 hectare (0.61 acre) of eelgrass beds on the northern shore of the Oakland Touchdown area. N-2 would also affect 0.50 hectare (1.2 acres) of eelgrass along northern shore of YBI during construction period. **Mitigation**—Eelgrass will be transplanted to adjacent shallow areas to in-fill existing stands with a	Placement of 14,900 m^3 (526,200 $ft.^3$) to 20,300 m^3 (716,800 $ft.^3$) of fill in Bay. Removal of existing span results in net reduction of bay fill. Realignment of Burma Road would result in loss of 0.03 hectare (0.07 acre) of non-tidal wetland on south side of Oakland Touchdown area. **Mitigation**—Loss of jurisdictional wetlands will be mitigated at a mitigation ratio of 3:1, by the creation of new wetland habitat or enhancement of existing wetlands within the project area. N-6 would result in the loss of 0.12 hectare (0.3 acre) of mudflats on the north side of the Oakland Touchdown. **Mitigation**—A conceptual mitigation plan will be developed for the replacement of mudflats at a ratio of 3:1. N-6 would result in removal of 0.25 hectare (0.61 acre) of eelgrass beds on the northern shore of the Oakland Touchdown area. N-6 would also affect 0.50 hectare (1.2 acres) of eelgrass along northern shore of YBI during construction period. **Mitigation**—Eelgrass will be transplanted to adjacent shallow areas to in-fill existing stands with a 3:1	Placement of 14,900 m^3 (526,200 $ft.^3$ to 20,400 m^3 (720,400 $ft.^3$) of fill in Bay. Removal of existing span results in net reduction of bay fill. S-4 would affect 0.04 hectare (0.10 acre) of non-tidal wetlands on south. **Mitigation**—Loss of jurisdictional wetlands will be mitigated at a mitigation ratio of 3:1, by the creation of new wetland habitat or enhancement of existing wetlands within the project area. S-4 would result in the loss of 0.06 hectare (0.15 acre) of mudflats located on the south side of YBI. **Mitigation**—A conceptual mitigation plan will be developed for the replacement of mudflats at a ratio of 3:1. S-4 would affect 0.30 hectare (0.75 acre) of eelgrass along the south side of YBI. **Mitigation**—Eelgrass will be transplanted to adjacent shallow areas to in-fill existing stands with a 3:1 replacement ratio. S-4 would result in removal of shorebird upland refugia (valuable habitat during high tides) located

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

Impact Category	Retrofit Existing Structure Alternative	Replacement Alternative N-2	Replacement Alternative N-6	Replacement Alternative S-4
		3:1 replacement ratio. Potential permanent impacts to double-crested cormorant and American peregrine falcon. **Mitigation**—Mitigation for the American peregrine falcon will consist of a monitoring and release program conducted by the Santa Cruz Predatory Bird Research Group. Mitigation for permanent loss of habitat for the double-crested cormorant is currently being investigated and will include on-site or off-site mitigation or a combination of both. Potential loss of six coast live oak trees on YBI. **Mitigation**—Trees would be replaced in accordance with the City and County of San Francisco tree ordinance.	replacement ratio. Potential permanent impacts to double-crested cormorant and American peregrine falcon. **Mitigation**—Mitigation for the American peregrine falcon will consist of a monitoring and release program conducted by the Santa Cruz Predatory Bird Research Group. Mitigation for permanent loss of habitat for the double-crested cormorant is currently being investigated and will include on-site or off-site mitigation or a combination of both. Potential loss of six coast live oak trees on YBI. **Mitigation**—Trees would be replaced in accordance with the City and County of San Francisco tree ordinance.	on south side of the Oakland touchdown area. **Mitigation**—A restricted area of upland refugia would be included as part of the new park envisioned for the southern portion of the Oakland Touchdown. Potential permanent impacts to double-crested cormorant and American peregrine falcon. **Mitigation**—Mitigation for the American peregrine falcon will consist of a monitoring and release program conducted by the Santa Cruz Predatory Bird Research Group. Mitigation for permanent loss of habitat for the double-crested cormorant is currently being investigated and will include on-site or off-site mitigation or a combination of both. Potential loss of six coast live oak trees on YBI. **Mitigation**—Trees would be replaced in accordance with the City and County of San Francisco tree ordinance.
Cultural Resources **Historic Buildings**	Retrofit of the existing SFOBB East Span and support buildings is an adverse effect. View blockage of retrofit	Demolition of the existing SFOBB East Span and support buildings is an adverse effect. Adverse effect on Building 262 due to placement of structure overhead.	Demolition of the existing SFOBB East Span and support buildings is an adverse effect. Adverse effect on Building 262 due to placement of structure overhead.	Demolition of the existing SFOBB East Span and support buildings is an adverse effect. **Mitigation**—Caltrans would consult with affected and interest

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

Impact Category	Retrofit Existing Structure Alternative	Replacement Alternative N-2	Replacement Alternative N-6	Replacement Alternative S-4
	alternative would adversely effect Quarters 1. **Mitigation**—Caltrans would consult with affected and interest parties to define mitigation measures for inclusion in an MOA signed by FHWA, SHPO, ACHP, and U.S. Navy.	**Mitigation**—Caltrans would consult with affected and interest parties to define mitigation measures for inclusion in an MOA signed by FHWA, SHPO, ACHP, and U.S. Navy.	**Mitigation**—Caltrans would consult with affected and interest parties to define mitigation measures for inclusion in an MOA signed by FHWA, SHPO, ACHP, and U.S. Navy.	parties to define mitigation measures for inclusion in an MOA signed by FHWA, SHPO, ACHP, and U.S. Navy.
Archaeology	Construction activities would cause impacts to archaeological site CA-SFr-04/H. **Mitigation**—Caltrans would prepare an Archaeological Research Design and Treatment Plan and implement data recovery which will mitigate impacts to archaeological resources.	North-North Detour - Construction activities would cause impacts to archaeological site CA-SFr-04/H. **Mitigation**—Caltrans would prepare an Archaeological Research Design and Treatment Plan and implement data recovery which will mitigate impacts to archaeological resources.	All detours - Construction activities would cause impacts to archaeological site CA-SFr-04/H. **Mitigation**—Caltrans would prepare an Archaeological Research Design and Treatment Plan and implement data recovery which will mitigate impacts to archaeological resources.	All detours - Construction activities would cause impacts to archaeological site CA-SFr-04/H. **Mitigation**—Caltrans would prepare an Archaeological Research Design and Treatment Plan and implement data recovery which will mitigate impacts to archaeological resources.
Scientific Resources	Potential for disturbance of paleontologic resources during in-Bay construction due to retrofit existing piers and footings. **Mitigation**—Should paleontologic resources be discovered, Caltrans would ensure that State provisions to avoid destruction or loss are implemented.	Potential for disturbance of paleontologic resources during in-Bay construction to construct new piers and footings. **Mitigation**—Should paleontologic resources be discovered, Caltrans would ensure that State provisions to avoid destruction or loss are implemented.	Potential for disturbance of paleontologic resources during in-Bay construction to construction of new piers and footings. **Mitigation**—Should paleontologic resources be discovered, Caltrans would ensure that State provisions to avoid destruction or loss are implemented.	Potential for disturbance of paleontologic resources during in-Bay construction to retrofit existing piers and footings. **Mitigation**—Should paleontologic resources be discovered, Caltrans would ensure that State provisions to avoid destruction or loss are implemented.
Utilities	Utilities on the existing East Span may be modified. Utilities on the existing East	Utilities on the existing East Span will be relocated. Timing of utility relocation would be set to avoid	Utilities on the existing East Span will be relocated. Timing of utility relocation would be set to avoid	Utilities on the existing East Span will be relocated. Timing of utility relocation would be set to avoid

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

Impact Category	Retrofit Existing Structure Alternative	Replacement Alternative N-2	Replacement Alternative N-6	Replacement Alternative S-4
	Span would be maintained. Utilities on Bay bottom may be disturbed by construction. Submarine utilities would be avoided to the greatest extent possible. If utilities cannot be avoided, they will be relocated or protected in place.	interruption of service when portions of the existing span would be removed for connection of temporary detour ramps. Utilities on Bay bottom may be disturbed by construction. Submarine utilities would be avoided to the greatest extent possible. If utilities cannot be avoided, they will be relocated or protected in place.	interruption of service when portions of the existing span would be removed for connection of temporary detour ramps. Utilities on Bay bottom may be disturbed by construction. Submarine utilities would be avoided to the greatest extent possible. If utilities cannot be avoided, they will be relocated or protected in place.	interruption of service when portions of the existing span would be removed for connection of temporary detour ramps. Utilities on Bay bottom may be disturbed by construction. Submarine utilities would be avoided to the greatest extent possible. If utilities cannot be avoided, they will be relocated or protected in place.
Energy	No long-term impacts.	No long-term impacts.	No long-term impacts.	No long-term impacts.
CONSTRUCTION IMPACTS				
Construction Period Community Impacts	Safety and Security - Potential disruption of traffic movements, access obstruction to YBI and Oakland Touchdown facilities. Heavy vehicle movements, possible hazardous materials excavation and transport, and construction site activity. **Mitigation**—Best management practices (BMPs) in place to ensure construction safety for workers, local employees, and residents.	Safety and Security - Potential disruption of traffic movements, access obstruction to YBI and Oakland Touchdown facilities. Heavy vehicle movements, possible hazardous materials excavation and transport, and construction site activity. **Mitigation**—Best management practices (BMPs) in place to ensure construction safety for workers, local employees, and residents.	Safety and Security - Potential disruption of traffic movements, access obstruction to YBI and Oakland Touchdown facilities. Heavy vehicle movements, possible hazardous materials excavation and transport, and construction site activity. **Mitigation**—Best management practices (BMPs) in place to ensure construction safety for workers, local employees, and residents.	Safety and Security - Potential disruption of traffic movements, access obstruction to YBI and Oakland Touchdown facilities. Heavy vehicle movements, possible hazardous materials excavation and transport, and construction site activity. **Mitigation**—Best management practices (BMPs) in place to ensure construction safety for workers, local employees, and residents.

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

Impact Category	Retrofit Existing Structure Alternative	Replacement Alternative N-2	Replacement Alternative N-6	Replacement Alternative S-4
Construction Period Transportation Effects	Some I-80 disruption in off-peak periods. Closures and detours on YBI and Oakland Touchdown area local streets. Macalla Road delays due to trucks on YBI. **Mitigation**—Construction trucks using YBI would be restricted to the east side of the island with prohibitions in effect on Treasure Island Road. Motor vehicle detours would be constructed and flaggers employed to ensure motorist safety in the construction zone. Wide and oversized loads would be restricted to barges, where possible. The navigation channel would be constricted at times while the barges are in place to retrofit Pier E2 and construct new piers E2A and E2B. Caltrans would consult with the USCG to implement a vessel warning system when construction vessels are placed in the water within the bridge construction zone. Caltrans would obtain a permit to modify the existing bridge from the USCG pursuant to Section 9 of the Rivers and Harbors Act.	Some I-80 disruption in off-peak periods. Closures and detours on YBI and Oakland Touchdown area local streets. Macalla Road delays due to trucks on YBI. **Mitigation**—Construction trucks on YBI would be restricted to the island's east side; use prohibitions on Treasure Island Road. Flaggers used to direct traffic in construction zones. Wide and oversized loads would be restricted to barges, where possible. Possible closure of two YBI ramps - the eastbound right off-ramp and westbound right on-ramp on island's east side for 18 months. YBI bridge pier foundation construction will affect portions of Macalla Road, the SFOBB undercrossing, and USCG entrance. During final design, develop detours around temporary piers to maintain access to the USCG Station and Quarters 1-8 and to keep Macalla Road open at all times. 100-200 workers may be permitted to drive and park on YBI during construction, affecting capacity of the YBI ramps and causing traffic delays. Contractors to establish maximum number of workers driving and parking on the island.	Some I-80 disruption in off-peak periods. Closures and detours on YBI and Oakland Touchdown area local streets. Macalla Road delays due to trucks on YBI. **Mitigation**—Construction trucks on YBI would be restricted to the island's east side; use prohibitions on Treasure Island Road. Flaggers used to direct traffic in construction zones. Wide and oversized loads would be restricted to barges, where possible. Possible closure of two YBI ramps for 18 months - the eastbound right off-ramp and westbound right on-ramp on island's east side for 18 months. YBI bridge pier foundation construction will affect portions of Macalla Road, the SFOBB undercrossing, and USCG entrance. During final design, develop detours around temporary piers to maintain access to the USCG Station and Quarters 1-8 and to keep Macalla Road open at all times. 100-200 workers may be permitted to drive and park on YBI during construction, affecting capacity of the YBI ramps and causing traffic delays. Contractors to establish maximum number of workers driving and parking on the island.	Some I-80 disruption in off-peak periods. Closures and detours on YBI and Oakland Touchdown area local streets. Macalla Road delays due to trucks on YBI. **Mitigation**—Construction trucks on YBI would be restricted to the island's east side; use prohibitions on Treasure Island Road. Flaggers used to direct traffic in construction zones. Wide and oversized loads would be restricted to barges, where possible. Possible closure of two YBI ramps for 18 months - the eastbound right off-ramp and westbound right on-ramp on island's east side for 18 months. YBI bridge pier foundation construction will affect portions of Macalla Road, the SFOBB undercrossing, and USCG entrance. During final design, develop detours around temporary piers to maintain access to the USCG Station and Quarters 1-8 and to keep Macalla Road open at all times. 100-200 workers may be permitted to drive and park on YBI during construction, affecting capacity of

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

Impact Category	Retrofit Existing Structure Alternative	Replacement Alternative N-2	Replacement Alternative N-6	Replacement Alternative S-4
	Notification to mariners and other requirements would be specified in the bridge permit.	Temporary partial navigation channel closures could occur due to in-water construction activities. Consult with the USCG on a construction-period vessel warning system and obtain a Section 9 Bridge Permit. Temporary off-site parking will be provided to bldg. 10 if north-north detours are used on YBI.	Temporary partial navigation channel closures could occur due to in-water construction activities. Consult with the USCG on a construction-period vessel warning system and obtain a Section 9 Bridge Permit. Temporary off-site parking will be provided to bldg. 10 if north-north detours are used on YBI.	the YBI ramps and causing traffic delays. Contractors to establish maximum number of workers driving and parking on the island. Temporary partial navigation channel closures could occur due to in-water construction activities. Consult with the USCG on a construction-period vessel warning system and obtain a Section 9 Bridge Permit.
Construction Period Visual Changes	Visual change for residents and users of YBI at construction staging area. Construction activities may block views. All construction-related visual changes would be temporary. Nighttime construction lighting could cause glare. Direct lighting onto the immediate construction area.	Visual change for residents and users of YBI at construction staging area. Construction activities may block views. All construction-related visual changes would be temporary. Nighttime construction lighting could cause glare, potentially affecting the immediate vicinity. Caltrans would require contractors to direct lighting onto the immediate construction area and to avoid shining lights toward residences.	Visual change for residents and users of YBI at construction staging area. Construction activities may block views. All construction-related visual changes would be temporary. Nighttime construction lighting could cause glare, potentially affecting the immediate vicinity. Caltrans would require contractors to direct lighting onto the immediate construction area and to avoid shining lights toward residences.	Visual change for residents and users of YBI at construction staging area. Construction activities may block views. All construction-related visual changes would be temporary. Nighttime construction lighting could cause glare, potentially affecting the immediate vicinity. Caltrans would require contractors to direct lighting onto the immediate construction area and to avoid shining lights toward residences.
Construction Period Air Quality	Construction will generate air pollutant emissions from sources such as fugitive dust and equipment and marine vessel exhaust. All construction-related emissions would be temporary. **Mitigation—**	Construction will generate dust. All construction-related emissions would be temporary. **Mitigation**—BMPs would mitigate most construction dust problems. Contractor to conform with all air pollution rules, regulations, ordinances and statues.	Construction will generate dust. All construction-related emissions would be temporary. **Mitigation**—BMPs would mitigate most construction dust problems. Contractor to conform with all air pollution rules, regulations, ordinances and statues.	Construction will generate dust. All construction-related emissions would be temporary. **Mitigation**—BMPs would mitigate most construction dust problems. Contractor to conform with all air pollution rules, regulations, ordinances and

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

Impact Category	Retrofit Existing Structure Alternative	Replacement Alternative N-2	Replacement Alternative N-6	Replacement Alternative S-4
	BMPs would mitigate air pollutant emissions to the greatest extent feasible. Contractor to conform with all air pollution rules, regulations, ordinances and statues.			statues.
Construction Period Noise and Vibration	Construction period noise impacts to nearby residents. Impacts would be temporary and limited to specific locations. All construction equipment to conform to provisions in Section 7-1.01I of the latest edition of Standard Specifications. Contractors to install and use sound-attenuating fabric shrouds around pile-driver equipment during pile driving, to the extent possible. Where practicable, pile holes would be pre-drilled to reduce noise caused by pile driving.	Construction period noise impacts to nearby residents. Impacts would be temporary and limited to specific locations. All construction equipment to conform to provisions in Section 7-1.01I of the latest edition of Standard Specifications. Contractors to install and use sound-attenuating fabric shrouds around pile-driver equipment during pile driving, to the extent possible. Where practicable, pile holes would be pre-drilled to reduce noise caused by pile driving. Pile driving could occur within 25-30 meters (82-100) feet from Building 262. **Mitigation**—Caltrans will require use of cast-in-drilled-hole piles, if feasible, near Building 262 and will monitor the building during periods of pile driving. The use of explosives may be required for in-Bay construction of	Construction period noise impacts to nearby residents. Impacts would be temporary and limited to specific locations. All construction equipment to conform to provisions in Section 7-1.01I of the latest edition of Standard Specifications. Contractors to install and use sound-attenuating fabric shrouds around pile-driver equipment during pile driving, to the extent possible. Where practicable, pile holes would be pre-drilled to reduce noise caused by pile driving. Pile driving could occur within 25-30 meters (82-100) feet from Building 262. **Mitigation**—Caltrans will require use of cast-in-drilled-hole piles, if feasible, near Building 262 and will monitor the building during periods of pile driving. The use of explosives may be required for in-Bay construction of replacement alternatives. **Mitigation**—If explosives are used, measures would be developed to control distribution of rock	Construction period noise impacts to nearby residents. Impacts would be temporary and limited to specific locations. All construction equipment to conform to provisions in Section 7-1.01I of the latest edition of Standard Specifications. Contractors to install and use sound-attenuating fabric shrouds around pile-driver equipment during pile driving, to the extent possible. Where practicable, pile holes would be pre-drilled to reduce noise caused by pile driving. Pile driving could occur within 25-30 meters (82-100) feet from Building 262. **Mitigation**—Caltrans will require use of cast-in-drilled-hole piles, if feasible, near Building 262 and will monitor the building during periods of pile driving. The use of explosives may be

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

Impact Category	Retrofit Existing Structure Alternative	Replacement Alternative N-2	Replacement Alternative N-6	Replacement Alternative S-4
		replacement alternatives. **Mitigation**—If explosives are used, measures would be developed to control distribution of rock debris. Notifications and conditions would be developed in consultation with the CDFG and USCG.	debris. Notifications and conditions would be developed in consultation with the CDFG and USCG.	required for in-Bay construction of replacement alternatives. **Mitigation**—If explosives are used, measures would be developed to control distribution of rock debris. Notifications and conditions would be developed in consultation with the CDFG and USCG.
Construction Period Hazardous Wastes	Potential for impacts if construction workers or the public are exposed to hazardous wastes during grading and excavation activities or if the likelihood of hazardous waste migration were increased by construction activities. **Mitigation**—Workers on site that may be in contact with contaminated soil or groundwater would be required to have health and safety training. A Worker Health and Safety Plan would be prepared and implemented. Off-site disposal would be at an appropriate landfill or recycling facility. Removed soil would be transported by licensed waste haulers.	Potential for impacts if construction workers or the public are exposed to hazardous wastes during grading and excavation activities or if the likelihood of hazardous waste migration were increased by construction activities. **Mitigation**—Workers on site that may be in contact with contaminated soil or groundwater would be required to have health and safety training. A Worker Health and Safety Plan would be prepared and implemented. Demolition of all structures would include procedures for the identification, abatement, handling, and disposal of lead-based paint and asbestos. Off-site disposal would be at an appropriate landfill or recycling facility. Removed soil would be transported by licensed waste	Potential for impacts if construction workers or the public are exposed to hazardous wastes during grading and excavation activities or if the likelihood of hazardous waste migration were increased by construction activities. **Mitigation**—Workers on site that may be in contact with contaminated soil or groundwater would be required to have health and safety training. A Worker Health and Safety Plan would be prepared and implemented. Demolition of all structures would include procedures for the identification, abatement, handling, and disposal of lead-based paint and asbestos. Off-site disposal would be at an appropriate landfill or recycling facility. Removed soil would be transported by licensed waste haulers.	Potential for impacts if construction workers or the public are exposed to hazardous wastes during grading and excavation activities or if the likelihood of hazardous waste migration were increased by construction activities. **Mitigation**—Workers on site that may be in contact with contaminated soil or groundwater would be required to have health and safety training. A Worker Health and Safety Plan would be prepared and implemented. Demolition of all structures would include procedures for the identification, abatement, handling, and disposal of lead-based paint and asbestos. Off-site disposal would be at an appropriate landfill or recycling facility. Removed soil would be transported by licensed waste

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

Impact Category	Retrofit Existing Structure Alternative	Replacement Alternative N-2	Replacement Alternative N-6	Replacement Alternative S-4
		haulers.		haulers.
Construction Period Water Resources and Water Quality	Potential impacts from construction activities, including potential impacts from erosion, groundwater contamination from excavations, and accidental spills from construction equipment and materials. Prepare a SWPPP and require contractor to follow its provisions.	Potential impacts from construction activities, including potential impacts from erosion, groundwater contamination from excavations, and accidental spills from construction equipment and materials. Prepare a SWPPP and require contractor to follow its provisions.	Potential impacts from construction activities, including potential impacts from erosion, groundwater contamination from excavations, and accidental spills from construction equipment and materials. Prepare a SWPPP and require contractor to follow its provisions.	Potential impacts from construction activities, including potential impacts from erosion, groundwater contamination from excavations, and accidental spills from construction equipment and materials. Prepare a SWPPP and require contractor to follow its provisions.
Construction Period Natural Resources	Retrofit alternative has the potential to temporarily affect the American peregrine falcon, and double-crested cormorant. **Mitigation**—In prior consultation with USFWS, measures were developed and presented in the 1997 Biological Opinion. Measures include a monitoring and release program. Retrofit alternative has the potential to temporarily affect the chinook salmon, steelhead, green sturgeon, longfin smelt, and Pacific herring due to increases in turbidity and sediment mobilization. **Mitigation**—To minimize turbidity and	Potential for construction period and permanent impacts to the American peregrine falcon and double-crested cormorant. **Mitigation**—Measures for the American peregrine falcon would include monitoring and release efforts of the Santa Cruz Predatory Bird Research Group. Caltrans would monitor the double-crested cormorant colony during breeding season and prevent them from nesting on the bridge. Vibrations from blasting and pile driving activities could harass the harbor seals when resting at the haul-our site on the southwest side of YBI or foraging in the surrounding waters. **Mitigation**—Appropriate mitigation measures are currently being developed in consultation with the National Marine Fisheries	Potential for construction period and permanent impacts to the American peregrine falcon and double-crested cormorant. **Mitigation**—Measures for the American peregrine falcon would include monitoring and release efforts of the Santa Cruz Predatory Bird Research Group. Caltrans would monitor the double-crested cormorant colony during breeding season and prevent them from nesting on the bridge. Vibrations from blasting and pile driving activities could harass the harbor seals when resting at the haul-our site on the southwest side of YBI or foraging in the surrounding waters. **Mitigation**—Appropriate mitigation measures are currently being developed in consultation with the National Marine Fisheries Service.	Potential for construction period and permanent impacts to the American peregrine falcon and double-crested cormorant. **Mitigation**—Measures for the American peregrine falcon would include monitoring and release efforts of the Santa Cruz Predatory Bird Research Group. Caltrans would monitor the double-crested cormorant colony during breeding season and prevent them from nesting on the bridge. Vibrations from blasting and pile driving activities could harass the harbor seals when resting at the haul-our site on the southwest side of YBI or foraging in the surrounding waters. **Mitigation**—Appropriate mitigation measures are currently being developed in

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

Impact Category	Retrofit Existing Structure Alternative	Replacement Alternative N-2	Replacement Alternative N-6	Replacement Alternative S-4
	sediment mobilization during dredging and construction of cofferdams, silt curtains would be installed around work areas to the extent possible.	Service. Potential for construction period impacts to Chinook salmon, steelhead, green sturgeon, longfin smelt, and Pacific herring. **Mitigation**—Measures, such as the selection of certain dredge types and physical barriers, would be considered to reduce suspended sediment. In areas that are too large for a silt face, dredging would be limited in shallow water during the outmigration period (January 1 through May 31) to the extent possible. Blasting would be limited to the summer months (June 1 through October 1) where possible and additional measures may be developed. Seasonal herring spawning would be monitored by a qualified biologist. In-water construction activities would be suspended within 200 meters (656 feet) of observed spawn.	Potential for construction period impacts to Chinook salmon, steelhead, green sturgeon, longfin smelt, and Pacific herring. **Mitigation**—Measures, such as the selection of certain dredge types and physical barriers, would be considered to reduce suspended sediment. In areas that are too large for a silt face, dredging would be limited in shallow water during the outmigration period (January 1 through May 31) to the extent possible. Blasting would be limited to the summer months (June 1 through October 1) where possible and additional measures may be developed. Seasonal herring spawning would be monitored by a qualified biologist. In-water construction activities would be suspended within 200 meters (656 feet) of observed spawn.	consultation with the National Marine Fisheries Service. Potential for construction period impacts to Chinook salmon, steelhead, green sturgeon, longfin smelt, and Pacific herring. **Mitigation**— Measures, such as the selection of certain dredge types and physical barriers, would be considered to reduce suspended sediment. In areas that are too large for a silt face, dredging would be limited in shallow water during the outmigration period (January 1 through May 31) to the extent possible. Blasting would be limited to the summer months (June 1 through October 1) where possible and additional measures may be developed. Seasonal herring spawning would be monitored by a qualified biologist. In-water construction activities would be suspended within 200 meters (656 feet) of observed spawn.

Source: Parsons Brinckerhoff, September 1998.

CHAPTER 1
PURPOSE OF AND NEED FOR PROJECT

1.1 PROJECT PURPOSE

The purpose of the San Francisco-Oakland Bay Bridge (SFOBB) East Span Seismic Safety Project (East Span Project) is to provide a lifeline[1] vehicular connection that:

- Connects Yerba Buena Island (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 an maximum credible earthquake[2] (MCE); and
- Improves operational and safety design to meet current standards to the greatest extent possible.

The SFOBB East Span Project will provide a seismically upgraded vehicular crossing for current and future users. SFOBB East Span Project replacement bridge alternatives will not preclude a pedestrian/bicycle path.

1.2 NEED FOR PROJECT

The existing East Span must be replaced or retrofitted because it is not expected to withstand an MCE on the San Andreas or Hayward faults, it does not meet "lifeline" criteria for providing emergency relief access following an MCE, and it does not meet current operations and safety design standards.

The project is proposed to address 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 or survive or be usable after an MCE;

[1] 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.

[2] 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 7-1/4 on the Hayward Fault. Refer to Apendix K for a discussion of area rock motion.

- 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 design standards for operations and safety.

Each of these needs is described in the following sections.

1.2.1 "Lifeline" Connection - The existing SFOBB East Span does not provide a "lifeline" connection that is usable after an MCE.

Improvements to the existing East Span are needed to address seismic safety deficiencies and provide a bridge crossing that is usable soon after a major seismic event. It is likely that the existing SFOBB East Span would develop multi-span failures leading to collapse and loss of life in the event of an MCE. The East Span does not provide for public safety during an MCE.

Maximum Credible Earthquake

The seismic design criteria set for the East Span Project have been established as an 8 magnitude earthquake on the San Andreas Fault or a 7-1/4 magnitude earthquake on the Hayward Fault. The MCE on each of these faults is defined as the largest earthquake that appears to be reasonably capable of occurring based on current geological knowledge. However, these values could be exceeded. The probability of an MCE occurring on one of these faults is approximately one in four over the next two to three decades.[3]

An MCE on either the San Andreas or Hayward faults would be expected to inflict far greater damage to the SFOBB than was experienced from the 1989 Loma Prieta earthquake. This is due to the potential for the epicenter of an event on either the San Andreas or Hayward faults to be nearer the bridge, as well as the expected greater magnitude of the MCE compared with that of the Loma Prieta earthquake (magnitude 7.1). It is estimated that an MCE with an 8 magnitude would generate in excess of 30 times more energy than the Loma Prieta earthquake. Feasibility of reopening the existing East Span to traffic following an MCE would be limited or precluded without the seismic safety improvements proposed in the East Span Project.

Lifeline Structure

The SFOBB provides a critical connection between San Francisco, the East Bay, and the I-80 corridor to the east. Designation by the California Department of Transportation (Caltrans) of the SFOBB corridor as a lifeline system connection represents the State's intention to use the SFOBB to provide a high level of post-earthquake transportation service for emergency response and support for the economic livelihood of the Bay Area.

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[3] U.S. Geological Survey, Probabilities of Large Earthquakes in the San Francisco Bay Region, California, U.S. Geological Survey Circular 1053. 1990.

The criteria for state lifeline route designation[4] and their applicability to the SFOBB East Span Project are listed below.

- The route provides emergency relief access through or across a potentially impacted region, connecting major population centers within the region - The SFOBB East Span links San Francisco and the San Francisco Peninsula with Oakland and the East Bay.

- For areas with more than one route providing interregional access, the route provides the most effective emergency relief access - The SFOBB, one of five toll bridges crossing San Francisco Bay, provides the shortest and most direct access between the cities of San Francisco and Oakland. The SFOBB provides a high-capacity (10-lane) direct connection between two major Bay Area communities (San Francisco and Oakland).

- The route provides direct or nearby access to and from major emergency response and recovery supply centers and staging areas - The SFOBB provides the most direct access between the medical centers in San Francisco and Oakland and the ports of San Francisco and Oakland.

- The route provides access to an airport (military or civilian), seaport, major rail facility, or a major distribution center that would be involved in immediate relief activities - The SFOBB provides access to the Port of San Francisco and the Port of Oakland. It is near the Union Pacific Railroad yards at the Port of Oakland. It is part of the lifeline route that provides vehicular access to and from Travis Air Force Base in Fairfield, which would be a major distribution center providing immediate post-earthquake relief.

Cooperative earthquake response planning among Bay Area transportation providers focuses on the roles of agencies, including Caltrans, in post-earthquake response. Emphasis is placed on actions during the first 72 hours after an earthquake. Response scenarios do not call out procedures to be implemented at specified locations. Overall responsibilities for participating agencies are defined.

Caltrans preparedness planning consists of activities, including cooperation with the California Highway Patrol (CHP), in developing traffic control and evacuation procedures; activating emergency response resource centers; and establishing route recovery plans.[5]

Although no detailed plan for a lifeline SFOBB post-earthquake use is defined, it can be anticipated that the structure would be used to transport heavy equipment, such as cranes and bulldozers, to work sites. The structure would also be used to distribute supplies from the San Francisco and Oakland ports to recovery centers. Automobile

[4] Memorandum to Governor Pete Wilson from Dean R. Dunphy, Secretary, Business, Transportation and Housing Agency, January 10, 1997 re "Consideration of Replacement of the Eastern Spans of the San Francisco-Oakland Bay Bridge to Provide Seismic Safety."

[5] Association of Bay Area Governments, Riding Out Future Quakes (www.abag.ca.gov/bayarea/eqmaps), 1998.

and bus transit traffic would likely be banned from the SFOBB so as not to interfere with emergency response, then would be restored on the SFOBB East Span as feasible. As a lifeline vehicular bridge, the SFOBB East Span would have the flexibility to move equipment and goods during post-earthquake recovery that cannot be accommodated by Bay Area Rapid Transit (BART) and ferry service.

1.2.2 People, Freight, and Goods Movement - The existing SFOBB East Span cannot maintain high levels of freight and goods movement following an MCE.

The SFOBB East Span, currently operating at capacity, accommodates approximately 274,000 vehicles each day. These vehicles transport approximately 350,000 people daily between San Francisco and Oakland, making the East Span a critical transportation link in the Bay Area. Providing a seismically safe lifeline vehicular bridge crossing is critical to retaining the ability to move high volumes of people between San Francisco, the San Francisco Peninsula, and the East Bay.

The SFOBB is a primary route for movement of freight and goods between the San Francisco Peninsula and the East Bay. It provides access for San Francisco to the intrastate and interstate trucking network in the East Bay and beyond. The SFOBB provides a link for seaport cargo and air freight delivery between the ports and airports in both San Francisco and Oakland. The bridge is also a link for local delivery of freight and goods. The SFOBB carries the greatest amount of total traffic and truck traffic of the Bay Area toll bridges (see Table 1.2-1). Maintaining the capacity of the East Span to accommodate large volumes of truck traffic is important for distribution of freight and goods to facilitate economic recovery following an MCE. Disruption of this critical link in the transportation system by damage or failure due to an earthquake would require rerouting approximately 11,000 truck trips per day to other toll bridges - assuming these other bridges are not similarly damaged. Extended interruption of the capacity of the East Span to accommodate large numbers of trucks would have an adverse effect on the local and regional economy.

Table 1.2-1 Average Annual Daily Total Traffic and Truck Traffic on Bay Area Toll Bridges

Bridge	Total AADT	Truck AADT	Percent Trucks	Percent Large Trucks*
SFOBB	274,000	11,508	4.2	40
Dumbarton	59,000	2,283	3.8	34
San Mateo-Hayward	77,000	5,040	6.5	42
Golden Gate	118,000	1,888	1.6	35
Richmond-San Rafael**	52,000	3,623	6.9	43
Carquinez	105,000	6,405	6.1	59
Benicia-Martinez	91,000	7,007	7.7	50

Source: 1996 Average Annual Daily Truck Traffic on the California State Highway System, Caltrans, October 1997.

*Percentage of 4- and 5-axle trucks of total trucks.

**Measurement location at junction of I-580/Route 101, Marin County.

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

Design standards are applied to bridge and roadway projects to provide a safe facility. The SFOBB East Span, constructed in the 1930s, does not meet all of the current mandatory and advisory design standards. Features of the current bridge that do not meet current standards are:

- Typical Section - Lanes on the existing East Span are too narrow. Existing lanes are 3.5 meters (11.5 feet) wide compared to the 3.6-meter (12-foot) standard. The standard has been increased to accommodate large trucks and to separate vehicles traveling at higher speeds than when the bridge was constructed.

- Roadway Shoulders - The existing East Span does not have roadway shoulders. Standard shoulder widths are 3 meters (10 feet) on either side of the roadway. Provision of shoulders on the SFOBB East Span would provide space for stalled vehicles to be moved out of travel lanes. Lack of shoulders contributes to the high levels of congestion caused by even minor incidents on the existing East Span.

- Horizontal Alignment - The East Span lower deck approaching the east shore has a non-standard straight roadway length between two curves: 18.3 meters (60 feet) compared to the current 176-meter (577-foot) standard. Provision of a straight section of roadway between curves allows drivers to anticipate upcoming changes in roadway alignment and maintain vehicle control.

- Vertical Alignment - Where the existing East Span upper deck roadway meets the existing YBI Tunnel entrance, the bridge connection has a series of vertical alignment changes that would not occur on a typical roadway. These vertical alignment changes reduce the amount of roadway a driver can see entering or leaving the tunnel and reduce the amount of time a driver has to respond to conditions in front of the vehicle. The current standard for vertical curves is 160 meters (525 feet). The existing vertical curve approaching the YBI Tunnel is 16 meters (53 feet).

- Superelevation - Curving roadways are designed to bank (elevation of either side of the roadway is different) to promote safe turning of vehicles and provide driver comfort against outward centrifugal force. The existing East Span curve east of the tunnel portal has a non-standard superelevation rate of five percent compared to the standard eight percent.

- Clearances - The minimum vertical clearance on the existing East Span east of the tunnel is 4.9 meters (16 feet) compared to the 5.1-meter (17-foot) standard. Height standards above roadways have increased to accommodate larger vehicles and the need to transport specialized cargo on interstate highways. Horizontally, there is no space between the travel lanes and the bridge rail on the East Span. Standard minimum horizontal clearance is 1.2 meters (4 feet).

- Stopping Sight Distance - The East Span has inadequate stopping sight distance around the curve on the existing bridge 520 meters (1,706 feet) east of the tunnel portal. According to current standards, the stopping sight distance for the inside lane would accommodate only a 38 kph (25 mph) speed.

1.3 BACKGROUND

1.3.1 The San Francisco-Oakland Bay Bridge

The SFOBB is historically important in the Bay Area and world wide. Construction of this structure began in 1933 and was completed and opened to traffic in 1936. At the time of its construction, the bridge was the world's longest vehicular bridge, and the YBI Tunnel, a double-decked structure, was the largest bore tunnel of its time at 23 meters (76 feet) long by 15 meters (50 feet) wide by 15 meters (50 feet) high (see Figure 1-1 in Appendix A).

Key System

The "Key System" was an electrified interurban, light-rail system that utilized the south side of the lower deck of the East and West Spans of the SFOBB. It shared the lower deck with trucks and buses, while automobile traffic traveled in six lanes on the upper deck. The Key System commenced operation in 1939 and continued service until 1958. Between 1939 and 1941, two other rail lines, the Interurban Electric and the Sacramento Northern, also operated on the SFOBB.

The Key System connected Oakland and Berkeley with San Francisco. The system terminated in San Francisco at the Transbay Transit Terminal where passengers could transfer to the San Francisco Muni system. In total, the Key System trains operated on 106 kilometers (66 miles) of track on the SFOBB and in the East Bay.

Patronage on the Key System peaked in 1945 with 37,334,000 passengers annually. By 1957, ridership had declined to about 6 million. Daily ridership in 1945 was 102,228 passengers and 16,747 passengers in 1957. As a result of the decrease, the Key System rail lines were abandoned and the routes were converted to AC Transit bus service in 1958.

When Key System rail service ended, the lower deck of the SFOBB was converted to automobile use. To accommodate these changes, significant modifications were made in San Francisco, on the SFOBB, YBI, and in the Oakland Touchdown area, including new additional access to and from the SFOBB, removal of the track ties and other railroad facilities from the lower deck of the SFOBB, and construction of new roadways to and from the SFOBB in Oakland.

The SFOBB currently serves approximately 350,000 people in the 274,000 vehicles that use the bridge each day. The SFOBB provides regional access between the San Francisco Peninsula and the East Bay. As a component of Interstate 80 (I-80), it is a critical link in the interstate network. The Dwight D. Eisenhower System of Interstate and Defense Highways, established during Eisenhower's presidency in 1954, is a network of access-controlled and grade-separated highways designed to serve the

national defense and to connect states and routes of continental importance in Canada and Mexico.[6]

The SFOBB is a double-deck structure carrying five traffic lanes on each level. The West Span connects San Francisco to YBI. A concrete viaduct and approach ramps eastward from Fifth Street in San Francisco at the west end, 1,130 meters (3,707 feet) long, connect to the two suspension spans, each over 1,400 meters (4,593 feet) long. On the island, there are two concrete viaducts, 165 meters (541 feet) and 65 meters (213 feet) in length, at either end of the 164.4-meter (539-foot) long double-deck tunnel.

The East Span is the portion of the structure between YBI and Oakland. A 800-meter (2,625-foot) long viaduct extends from the YBI Tunnel east portal eastward across the island. A series of steel truss spans carry the highway across the eastern portion of the Bay. The steel spans include a 737-meter (2,418-foot) cantilever truss adjacent to the island, followed by five high truss spans 155.1 meters (509 feet) each, and 14 shorter spans, which bring the roadways to the East Bay shoreline.

1.3.2 Effects of the Loma Prieta Earthquake and a Maximum Credible Earthquake

On October 17, 1989, the Loma Prieta earthquake struck the San Francisco Bay Area. Its epicenter was in a sparsely populated area of the Santa Cruz Mountains, 97 kilometers (60 miles) away from the SFOBB. The Office of Emergency Services (OES) reports that the earthquake caused 62 deaths and $5.6 billion in property damage and 8,000 people were left homeless. Over 1,300 buildings were destroyed and 20,000 buildings were damaged.[7] On the SFOBB, the earthquake caused a portion of the upper deck of the East Span to collapse onto the lower deck, resulting in one death. The East Span was closed for four weeks while the damage was repaired. It is estimated that the increased delay experienced by commuters rerouted to other Bay crossings, including other modes such as ferries or BART, cost as much as $12 million.

An MCE on the San Andreas fault could generate over 30 times more energy than the Loma Prieta earthquake. But an MCE on the Hayward fault could generate about the same energy as the Loma Prieta earthquake. Heavy damage could be much more widespread, including the collapse of thousands of buildings, extensive infrastructure damage, and major loss of life. The magnitude of such a natural disaster would necessitate the kind of emergency access provided by the bridge retrofitted to lifeline standards. On the existing SFOBB East Span, an MCE could cause catastrophic bridge failure, potentially resulting in numerous immediate casualties and requiring many months to reopen the bridge or years to build a replacement. Immediate emergency response and more long-term economic recovery would be delayed.

[6] Federal-Aid Highway Act of 1954.

[7] California Office of Emergency Services, Loma Prieta Earthquake: Homes/Businesses Damaged/ Destroyed, December, 1989.

1.3.3 Analysis of Potential Retrofit of SFOBB East Span

Caltrans began action following the Loma Prieta earthquake to design seismic safety improvements for the SFOBB East Span. Seismic safety strategies initially investigated focused on retrofit of the existing East Span structure. A retrofit alternative was devised and initial environmental review conducted. Consultation with permitting and regulatory agencies was initiated.

An important consideration for the retrofit of bridges maintained by Caltrans is the cost of upgrading the existing structures to current seismic criteria measured against the remaining useful life of the bridges. Caltrans has developed a cost/benefit formula to assist in the determination of the need to retrofit a bridge compared to replacing it. First it must be determined that there is a viable retrofit alternative (i.e., the existing structure can be retrofitted to meet seismic safety criteria established for the structure). This decision is made by Caltrans with input from a Seismic Advisory Board, an industry and academic advisory panel which was established following the Loma Prieta earthquake, to provide Caltrans assistance in determining effective seismic safety technologies.

The Caltrans formula takes into account both construction costs and life-cycle costs[8]. Cost comparisons of retrofit and replacement alternatives indicated that seismic retrofit of the existing span could be accomplished at a lower cost than the cost to replace the structure. However, replacement bridge alternatives would have lower life-cycle costs[9]; therefore, consideration of bridge replacement was recommended by Caltrans and the Business, Transportation and Housing Agency to Governor Pete Wilson.

1.3.4 Analysis of Potential Replacement of the SFOBB East Span

In February 1997, Governor Pete Wilson adopted the recommendations of the Business, Transportation and Housing Agency and Caltrans that replacement of the SFOBB East Span be considered. The Metropolitan Transportation Commission (MTC) organized the San Francisco-Oakland Bay Bridge Design Task Force (Task Force) to consider replacement bridge alternatives. Alternatives under consideration in this environmental document include replacement options defined through the Task Force proceedings. The Task Force mandate is to develop a consensus recommendation on a design option for a new eastern span of the SFOBB and recommend any additional features that might be included in the design of the bridge that would not be borne by funding allocated from the State of California. A description of the MTC process is provided in the Preface and Appendix E: Consultation and Coordination, of this Draft EIS.

[8] California Department of Transportation, Transportation Economics Planning Program, Retrofit vs. New Bridge, An Economic Analysis for the East Span of the San Francisco-Oakland Bay Bridge, April 1997.
[9] Memorandum to Governor Pete Wilson from Dean R. Dunphy, Secretary, Business, Transportation and Housing Agency, January 10, 1997, re "Consideration of Replacement of the Eastern Spans of the San Francisco-Oakland Bay Bridge to Provide Seismic Safety.

1.3.5 Other SFOBB Seismic Safety Projects

Caltrans is undertaking a number of independent actions to address the overall need of providing a lifeline bridge connection between the cities of San Francisco and Oakland. In combination, these actions will provide for a lifeline structure connecting San Francisco and the San Francisco Peninsula to the East Bay. The individual projects, in addition to contributing to the seismic safety improvement of the SFOBB, have been defined to contribute independently to seismic safety of bridge users in the event of an MCE. As each of the projects is completed, bridge users will benefit from seismic safety improvements and specific lifeline access issues will be resolved.

In addition to the East Span Project, Caltrans is undertaking other actions to seismically retrofit the SFOBB. These projects are shown in Figure 1-1 and consist of:

- West Approach Seismic Replacement - The West Approach extends from Fifth Street to the West Anchorage in San Francisco. The retrofit of this portion of the bridge calls for complete replacement of most of the structure. Completion of the West Approach Seismic Replacement Project will provide for lifeline access into San Francisco and the Transbay Transit Terminal area in the event of an MCE.

- West Span Seismic Retrofit - The West Span is the portion of the structure from the San Francisco Anchorage to YBI. Retrofit of the West Span will add bracing beneath the upper deck, add plates on the towers, and replace the existing lattice work members on the truss portions with solid or perforated plates. On completion of the West Span Seismic Retrofit Project, lifeline access will be provided between San Francisco, the San Francisco Peninsula, and YBI and ensure that bridge damage during an MCE would not affect navigation in the ship channel underneath the structure.

- West Viaduct, YBI - The West Viaduct is the portion of the bridge on YBI immediately west of the YBI Tunnel. Retrofit of the West Viaduct will strengthen the existing double-deck structure by retrofitting or replacing columns and footings and replacing the bent caps underneath the upper deck on-ramp.

- Yerba Buena Island Tunnel - The seismic retrofit strategy for the tunnel will be to protect users from collapsing rubble. Rock bolts will tie back the portals, arched headwalls, selected retaining walls, architectural walls, and one rock slope north of the west portal. Seismic safety improvements to the tunnel will ensure that the high traffic volumes using SFOBB could be maintained in an MCE and that detours on the island would not be required to move through-traffic.

- East Span Interim Seismic Retrofit - Work is currently in progress to implement an interim seismic retrofit of the existing East Span to withstand a likely earthquake (estimated to be an earthquake that induces less than 0.25g on the existing structure), but not an MCE. The Interim Retrofit Project consists of strengthening bents and columns on the east viaduct (on YBI) and strengthening piers, bents, and trusses at selected locations on the East Span structure. This project will provide for increased seismic safety on the existing structure until an East Span retrofit/replacement alternative is implemented.

1.3.6 Legislative Framework

The California Legislature has in various legislative findings and declarations expressed its intent to complete the seismic retrofit of State-owned and State-operated highways. Following the 1971 San Fernando Valley earthquake, seismic design standards for transportation facilities were reassessed in light of the unanticipated damage to certain roadway structures, and a retrofit program was begun. The extensive roadway damage caused by the 1989 Loma Prieta earthquake in northern California and the 1994 Northridge earthquake in southern California prompted an acceleration of the retrofit program, including several efforts to increase program funding. In 1991, the legislature authorized financing seismic retrofit projects from motor vehicle fuel tax revenues and additional funding mechanisms, declaring that "it is in the best interests of the people of California to immediately finance retrofit projects to make state highways safe during seismic events, and to offset any possible delays caused by these projects on approved state highway projects contained in the state transportation improvement program for 1990..." (Government Code, Chapter 5, Article 1, Amended: Statutes of 1991, Chapter 195).

In 1995, recognizing the increasing financial drain of the ongoing seismic retrofit program on limited funding resources, the legislature placed the Seismic Retrofit Bond Act of 1996, or Proposition 192, on the March 1996 ballot, declaring that "the completion of seismic safety retrofit work is essential to the welfare and economy of the state," (Government Code, Title 2, Division 1, Chapter 12.48, Article 1). This act, approved by the voters in 1996, authorized the sale of over $2 billion in state revenue bonds for financing retrofit improvements and temporarily suspended state statutes that were deemed to potentially delay or unnecessarily encumber their implementation. The seismic retrofit and rehabilitation of the SFOBB East Span is a priority project under the state's accelerated retrofit program.

Senate Bills 226 and 60 were passed by the State Legislature and signed into law by the Governor on August 20, 1997. Together, these bills provide a financing mechanism and identify funding sources for seismic improvements for Bay Area toll bridges, including the SFOBB East Span. Senate Bill 226 reassigns programming authority for Bay Area toll bridges from the California Transportation Commission to the Metropolitan Transportation Commission, superseding the state Toll Bridges Program. Senate Bill 60 sets a one dollar toll surcharge on all Bay Area toll bridges, including the SFOBB, and identifies State Highway Account funds available for seismic upgrades.

Implementation of the East Span Project will be funded from a combination of sources. Approximately 36.5 percent of project costs will be funded by state fuel tax revenues earmarked for seismic upgrade projects. State Seismic Retrofit Revenue Bonds issued by the state after voter approval of Proposition 192 in March 1996 will fund an additional 27 percent. The one dollar toll surcharge on Bay Area toll bridges for eight years will fund the remaining 36.5 percent. The toll surcharge can be funded for up to two additional years to pay for bridge amenities. These include a cable-supported or other "signature" bridge design, the Transbay Transit Terminal (including possible relocation and/or ramp reconfiguration), and the addition of pedestrian/bicycle access on the SFOBB.

Seismic retrofit projects, including the East Span Project, are exempt from the requirements of the California Environmental Quality Act (CEQA) under California Streets and Highways Code Section 180.2 and CEQA Section 21080 (see Chapter 5). Although CEQA review will not be conducted for the project, detailed environmental and socioeconomic review is being undertaken to comply with the National Environmental Policy Act (NEPA). The East Span Project will also be subject to the permitting requirements of federal and state regulatory agencies. Consultation is under way with public agencies, including U.S. Coast Guard, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, Advisory Council on Historic Preservation, Metropolitan Transportation Commission, National Marine Fisheries Service, San Francisco Bay Conservation and Development Commission, California Department of Fish and Game, State Historic Preservation Officer, State Lands Commission, San Francisco Bay Regional Water Quality Control Board, and the Association of Bay Area Governments.

CHAPTER 2
PROJECT ALTERNATIVES

This chapter describes the alternatives that are analyzed in this Draft Environmental Impact Statement (DEIS), along with the various design options under consideration. This chapter also describes project alternatives that were initially considered but were withdrawn from consideration prior to preparation of this document, and the reasons for their withdrawal.

The Metropolitan Transportation Commission (MTC) is the transportation planning, coordinating, and financing agency for the nine-county San Francisco Bay Area. It functions both as the region's metropolitan transportation planning agency (RTPA) and as the region's metropolitan planning organization (MPO)—state and federal designations, respectively. The Regional Transportation Plan (RTP) which MTC prepares, is a comprehensive guide for the development of mass transit, highway, airport, seaport, railroad, bicycle, and pedestrian facilities within the Bay Area. The MTC also allocates state and federal funds for transportation projects based on compatibility with this plan.

MTC, based on recommendations from its Bay Bridge Design Task Force, has stated a preference for a northern replacement alignment bridge with a self-anchored suspension main span and a pedestrian/bicycle path along the south side of the eastbound deck. The MTC recommended alternative is included in this EIS as Replacement Alternative N-6, self-anchored suspension design variation. The California Department of Transportation (Caltrans) and the Federal Highway Administration (FHWA) have not identified a preferred alternative in this Draft EIS.

The Federal Highway Administration (FHWA), pursuant to the 1991 Intermodal Surface Transportation Efficiency Act, as amended, prepares a Major Investment Study (MIS) for "highway improvements that are expected to have a significant effect on capacity, traffic, level of service or mode share. FHWA prepares MIS's at the transportation corridor or sub-area level to address federally funded projects. Because the East Span Project is not federally funded and is a seismic safety project that does not change current bridge capacity, no MIS has been produced.

Pursuant to the National Environmental Policy Act (NEPA), all alternatives currently under consideration are analyzed to an equal level of detail in later sections of this document. Identification of the project preferred alternative will occur after this document is circulated for a 45-day public review period and all public comments are received and considered.

Since the No-Build Alternative does not satisfy the project purpose and need in terms of seismic safety, it is presented and evaluated primarily as a basis of comparison with the other alternatives. As noted in Chapter 1, Caltrans is currently adding seismic strengthening elements to the existing East Span structure as an interim measure. That project has received environmental approval pursuant to NEPA and is not evaluated as an alternative in the Draft EIS. The No-Build Alternative assumes completion of this interim work.

2.1 INTRODUCTION

The proposed project seeks to retrofit or replace the existing San Francisco-Oakland Bay Bridge (SFOBB) East Span, which has connected Oakland and Yerba Buena Island (YBI) since 1936. The purpose of the SFOBB East Span Seismic Safety Project (East Span Project) is to provide a seismically upgraded "lifeline" vehicular crossing for current and future users. This project is one of several that Caltrans is undertaking to address the overall need of providing a lifeline bridge connection between the East Bay, San Francisco, and the San Francisco Peninsula. The other projects include replacing the West Approach to the SFOBB West Span in San Francisco, retrofitting the West Span, West YBI Viaduct, and YBI Tunnel, and the interim retrofit on the East Span (see Section 1.3.5).

2.1.1 Development of Alternatives

Caltrans has considered and performed preliminary engineering on a range of possible project alternatives for inclusion in this Draft EIS. The retrofit and replacement alternatives, along with the No-Build Alternative, are described in Section 2.2. Replacement bridge design variations that are under consideration are described in Section 2.3. Section 2.4 provides a comparison of the alternatives' characteristics, including costs, constructibility, and potential to meet the purpose and need. Section 2.5 discusses multi-modal options for alternatives, and Section 2.6 describes construction scenarios for each of the build alternatives. Section 2.7 describes the alternatives, design variations, and temporary detour options that were considered and subsequently withdrawn from further consideration and the reasons for their withdrawal.

The range of alternatives considered in the Draft EIS was established by Caltrans and FHWA in accordance with NEPA requirements and in consultation with permitting and regulatory agencies under guidance of the NEPA/404 Integration Memorandum of Understanding (NEPA/404 MOU). The NEPA/404 integration process is implemented when a project has the potential to affect waters of the U.S. under the jurisdictional authority of the U.S. Army Corps of Engineers (ACOE). Participants considered options and provided written concurrence in the range of alternatives and the criteria established for evaluation of alternatives. (See Appendix F for the concurrence letters from the NEPA/404 signatories.)

2.1.2 Project Limits/Location

The SFOBB crosses San Francisco Bay in an east-west direction in the central portion of the San Francisco Bay Area and provides a travel route between San Francisco and Alameda counties. The bridge touches down near Pier 26 in San Francisco and in northwest Oakland between the East Bay Municipal Utility District (EBMUD) water treatment facility and the Emeryville Crescent tidal marsh. The west and east spans of the bridge are connected on YBI by viaduct sections on either side of the YBI Tunnel. A navigation channel is located between piers E-2 and E-3 of the SFOBB East Span. The channel, shown on Figure 2-2 (Appendix A), is 427 meters (1,400 feet) wide, with vertical clearance of 60 meters (197 feet) above Mean Sea Level (MSL). The East

Span Project will retrofit or replace the portion of the SFOBB between the east end of the tunnel on YBI and the SFOBB Toll Plaza (toll plaza) in Oakland. Figure 2-1 (Appendix A) shows the project location and Figure 2-2 (Appendix A) shows the project area limits.

The East Span Project is in San Francisco and Alameda counties. The western project limit is the west portal of the YBI Tunnel. The eastern project limit is the SFOBB Toll Plaza on a spit of land referred to as the Oakland Touchdown area. The project area is defined as the area within the project limits in which temporary and permanent structures would be placed by any of the alternatives and defines the area within which construction activities, including detours, would be expected to occur. The project area widens over water to allow for marine construction activities. In addition, Bay waters on the north side of YBI are included within the project area to allow staging for large construction equipment and bulk materials to be delivered to YBI by barge or vessel.

2.2 ALTERNATIVES CONSIDERED

Five alternatives, No-Build, Retrofit Existing Structure, Replacement Alternatives N-2, N-6, and S-4, are currently under consideration for the East Span Project. Alternatives N-2 and N-6 are aligned to the north of the existing SFOBB and Alternative S-4 aligns south of the existing bridge (see Figure 2-3 in Appendix A). Alignment drawings for the build alternatives are presented in Appendix A. Detour structures will be required on YBI for the three replacement alternatives (N-2, N-6, and S-4) in order to reroute traffic around the construction area while portions of the existing East Span are dismantled and a new transition structure is completed where the existing bridge now stands on YBI.

In order to connect the new bridge with the viaduct on YBI and the toll plaza at the Oakland Touchdown area, all three replacement alternatives would require dismantling the existing East Span facility. A description of the dismantling process is described in Section 2.6.3.

2.2.1 No-Build Alternative

The No-Build Alternative would retain the existing SFOBB East Span. The No-Build Alternative assumes some seismic improvements to the East Span have been completed as a prior project. The Interim Retrofit Project is currently under way to strengthen bents and columns on the viaduct section on YBI and strengthen or toughen piers, bents, and trusses at selected locations on the structure, so that the existing East Span would be able to withstand a smaller but more likely earthquake. This work is expected to be completed by late 1998. The No-Build Alternative is evaluated primarily as a basis for comparison with the build alternatives. (Note: The Interim Retrofit Project was environmentally approved with a Statutory Exemption under CEQA and a Categorical Exclusion under NEPA.)

2.2.2 Retrofit Existing Structure Alternative

This alternative would retrofit the existing 3,696-meter (12,127-foot) long SFOBB East Span to withstand an MCE, but would not provide a lifeline crossing. This alternative would retrofit the existing SFOBB East Span to withstand an MCE on the San Andreas or Hayward faults; however, it would not provide a lifeline connection. Although substantial modifications to the cantilever section are proposed as a part of the Retrofit Existing Structure Alternative, it is nevertheless anticipated that the cantilever section would experience substantial damage and require extensive reconstruction or replacement following an MCE. If damage is such that reconstruction of the cantilever section is feasible, this may require complete closure of the East Span from six months to one year. If, however, damage is sufficiently severe that replacement becomes necessary, the East Span would be completely closed for a substantially longer period of time. The Retrofit Existing Structure Alternative would retrofit both the existing East Span and the east viaduct section on YBI. The alignment of the bridge would remain unchanged and the bridge would remain a double-deck structure. (See Figures 2-4.1 through 2-4.4 in Appendix A.) Each deck roadway cross section would also remain the same, five 3.5-meter (11.5-foot) wide lanes with no roadway shoulders. The construction period for this alternative is estimated to be four years.

East Span

The seismic retrofit strategy for the Retrofit Existing Structure Alternative is based on strengthening and stiffening of the substructure (below deck, towers, and foundations). Large diameter piles would be added around the perimeter or on both sides of all existing foundations. New, larger pile caps would be constructed to join the expanded foundations. Figures 2-5 and 2-6 (Appendix A) show the "before" condition and "after" simulation of the retrofitted bridge.

The tower legs in the navigation channel would be encased in concrete. Isolator bearings would be installed on the top of the towers to isolate the superstructure from the most damaging earthquake motions. Isolator bearings are used to allow horizontal movement in extreme earthquake events.

Two new piers (bridge support columns founded in water) would be added to the cantilever main span just east of YBI. Pier E2, which would be encased in concrete, would have two new piers, E2A and E2B, on the west and east sides (see Figures 2-4.1 and 2-4.2 in Appendix A for locations of new piers). The seismic retrofit strategy would add a new edge truss to restrict deformations in the cantilever section. An edge truss is trusswork that is extended from the base of the lower deck to the bottom of the upper deck.

The Retrofit Existing Structure Alternative would modify the superstructure to permit large displacements (movements) at specified joints in the event of an earthquake. Retrofitting of truss members would include wind bracing and strengthening, floor grid, and vertical members.

Yerba Buena Island

The Retrofit Existing Structure Alternative would strengthen the east viaduct and piers. The substructure of the east viaduct would be retrofitted by encasing columns and footings in concrete, providing cast-in-drilled-hole piles/tie downs under the footings, and installing isolator bearings at the top of columns. Piers YB2, YB3, and YB4 would be encased in concrete and foundations expanded.

2.2.3 Replacement Alternative N-2

Replacement Alternative N-2 would construct a 3,585-meter long (11,759-foot long) new bridge north of the existing East Span and dismantle the existing structure. (See Figures 2-7.1 through 2-7.5 in Appendix A). The N-2 alignment parallels the existing bridge and maintains minimal clearance between the old and new structures to accommodate construction of the new bridge and dismantling the existing structure.

Replacement Alternative N-2 begins at the eastern portal of the YBI Tunnel. The existing YBI East Viaduct would be retrofitted. At Bent 48 (sees Figure 2-7.1a and 2-7.1b in Appendix A), the new bridge begins with a new transition structure separating the double-decked lanes to two parallel structures. Outrigger "frame" supports would be used to support the upper deck as the lower deck transitions to a structure parallel with the upper deck. The parallel structures curve, enter a tangent or straight section over the existing navigation channel, curve, and align on tangent toward the Oakland Touchdown area. The parallel structures 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 toll plaza.

Alternative N-2 would consist of two parallel structures supported by 22 piers over water and 19 bents supported by columns set on YBI and the Oakland Touchdown area. The structures would each be 25.07 meters (82 feet) wide and separated by 15 meters (50 feet). The typical roadway section for each bridge deck consists of five lanes, each 3.6 meters (12 feet) wide, left and right shoulders, each 3 meters (10 feet) wide, and traffic barriers. A 4.7-meter (15.5-foot) pedestrian/bicycle path would be located on the south side of the eastbound deck, 0.3 meter (1 foot) above the roadway elevation. A typical roadway cross section is presented in Figure 2-8 in Appendix A.

The height of the bridge, including the transition structure and the parallel structures, would vary in elevation from 50-55 meters (164-180 feet) above MSL at the east viaduct on YBI to 5 meters (16 feet) above MSL at the Oakland Touchdown. A typical profile for replacement alternatives is presented in Figure 2-9 in Appendix A.

2.2.4 Replacement Alternative N-6

Replacement Alternative N-6 would construct a 3,620-meter long (11,877-foot long) new bridge north of the existing East Span and dismantle the existing structure. (See Figures 2-10.1 through 2-10.5 in Appendix A). The N-6 alignment is aligned to minimize the depth to bedrock for a cable-supported structure. The N-6 alignment curves northward from the existing East Span to maximize panoramic views of the East Bay Hills for eastbound bridge users and San Francisco skyline views for westbound

bridge users. The northern limit of the alignment has been set to provide optimum views while minimizing intrusion into portions of the Bay where less favorable geologic conditions increase complexity and cost of constructing bridge piers and foundations.

The N-6 Replacement Alternative begins at the eastern portal of the YBI Tunnel. Part of the existing YBI East Viaduct would be retrofitted, modified, and partially demolished. At Bent 48 (see Figures 2-10.1a-2-10.1c in Appendix A), the new bridge begins with a transition structure separating the double-decked lanes into two parallel structures. Outrigger "frame" supports would be used to support the upper deck as the lower deck transitions out from below and parallel to the upper deck. The parallel structures curve, enter a tangent or straight section over the existing navigation channel, curve, then align on tangent toward the Oakland Touchdown area. The parallel structures 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 toll plaza.

Replacement Alternative N-6 consists of two parallel structures supported by 21 piers over water and 21 bents set on YBI and the Oakland Touchdown area. The structures would each be 25.07 meters (82 feet) wide and typically separated by 15 meters (50 feet). The typical roadway section for each bridge deck consists of five lanes, each 3.6 meters (12 feet) wide, left and right shoulders, each 3 meters (10 feet) wide and traffic barriers. A 4.7-meter (15.5-foot) pedestrian/bicycle path would be located on the south side of the eastbound deck, 0.3 meter (1 foot) above the roadway elevation. A typical cross section is presented in Figure 2-8 in Appendix A.

The height of the bridge, including the transition structure and the parallel structures, would vary in elevation from 50-55 meters (164-180 feet) above MSL at the east viaduct to 5-10 meters (16-33 feet) above MSL at the Oakland Touchdown. A typical profile for replacement alternatives is presented in Figure 2-9 in Appendix A.

2.2.5 Replacement Alternative S-4

Replacement Alternative S-4 would construct a 3,550-meter (11,644-foot) bridge south of the existing East Span and dismantle the existing structure. (See Figures 2-11.1 through 2-11.5 in Appendix A). The S-4 Alternative was developed to minimize bridge length and to avoid use of flat land to the north of the existing East Span on YBI while avoiding conflicts with the alignment of the EBMUD sewer outfall that aligns to the south of the existing East Span.

The S-4 alignment begins at the eastern portal of the YBI Tunnel. The existing YBI East Viaduct would be retrofitted. At Bent 48 (see Figures 2-11.1a and 2-11.1b in Appendix A), the new structure begins with a new transition structure separating the double-decked lanes to two parallel structures. Outrigger "frame" supports would be used to support the upper deck as the lower deck transitions to a structure parallel with the upper deck. The parallel structures curve, enter a tangent or straight section over the existing navigation channel, curve gradually, and align toward the Oakland Touchdown area. The parallel structures reach the Oakland shore to the south of the existing East Span and transition to the existing roadway west of the toll plaza.

Replacement Alternative S-4 would consist of two parallel structures supported by 23 piers over water; and 19 bents supported by columns, set on YBI, and the Oakland Touchdown area. The structures would each be 25.07 meters (82 feet) wide and separated by 15 meters (50 feet). The typical section for each bridge deck consists of five lanes, each 3.6 meters (12 feet) wide, left and right shoulders, each 3 meters (10 feet) wide and traffic barriers. A 4.7-meter (15.5-foot) pedestrian/bicycle path would be located on the south side of the eastbound deck, 0.3 meter (1 foot) below the roadway elevation. A typical roadway cross section is presented in Figure 2-8 in Appendix A.

The height of the bridge, including the transition structure and the parallel structures, would vary in elevation from 50-55 meters (164-180 feet) above MSL at the east viaduct to 5 meters (16 feet) above MSL at the Oakland Touchdown. A typical profile for the replacement alternatives is presented in Figure 2-9 in Appendix A.

2.3 REPLACEMENT ALTERNATIVES DESIGN VARIATIONS

Replacement alternatives are proposed as two parallel skyway structures, each having five traffic lanes, inside and outside shoulders, and a pedestrian/bicycle path on the eastbound deck. Design variations identified for the replacement alternatives are limited to the type of bridge to be constructed over the navigation channel. The bridge type variations apply only to the navigational portion of the crossing because the shallow water and the deep muds along 85 percent of the crossing necessitate the skyway design proposed for all of the replacement alternatives and design variations.

In addition to the design variations addressed here, certain refinements to the replacement alternatives will occur as bridge design advances. Based on the preliminary engineering design completed to date for a typical structure, replacement alternatives could be constructed of either steel or concrete. Steel and concrete are under evaluation for both skyway superstructure and main span tower options. Alternatives constructed of either material can be used to construct a bridge that meets lifeline criteria. Detailed analyses of costs, material availability, maintenance requirements, and effects to construction schedule will need to be conducted as design advances to determine the optimum construction material.

Final selection of the type of girder used to support the superstructure will also be determined based on engineering analyses yet to be completed. Options for a haunched girder, a variable depth beam between support piers, or a straight, constant depth girder will be evaluated. Selection of the superstructure type used for the bridge will be based on analyses of costs, material availability, maintenance requirements, and effects to construction schedule.

Additional design amenities will be added to the bridge as the design process moves to the next phase. Detailed amenities include railing design, lighting, and other elements which will refine the final design.

2.3.1 Main Span Types

Design options are being considered for the main span section of the alignment, which runs from the YBI viaduct, east across the navigation channel, then transitions to a skyway design to the Oakland Touchdown area. A number of bridge types have been evaluated based on seismic performance, aesthetic considerations, and ability to construct the bridge within the expedited construction schedule. Bridge types for the main span have been narrowed to two: cable-stayed design and self-anchored suspension design. Both main span types would include a tower of 58 meters (520 feet) in height. Additionally, both main span types would maintain the navigation channel east of YBI.

In addition to the two main span types, a third variation is to construct a skyway along the entire SFOBB East Span crossing. The skyway would also maintain the navigation channel near YBI.

Cable-Stayed Design

The cable-stayed design includes the use of steel cables to connect the bridge deck directly to the towers. Most cable-stayed bridges have one or two towers. A single concrete vertical tower is being considered for the East Span Project (See Figure 2-12 in Appendix A). Cable-stayed bridges have been used in several different countries since the 1940s. Recent examples constructed in the United States include the Sunshine Skyway in Tampa, Florida, and the Thomas Bridge in Georgia.

The cable-stayed system allows for longer spans crossing the navigational channel than could be provided with a skyway variation which requires additional piers to provide structure supports; however, it imposes additional alignment constraints. To support the two decks from a single tower, the decks of each of the parallel bridge structures must be almost parallel and at the same approximate elevation for the entire length of the main span. The main span cannot begin until each deck alignment meets these constraints. The replacement alignments under consideration have been set to accommodate the geometric requirements for a cable-stayed main span.

The cable-stayed main span would cost approximately $82 million more than the total estimated cost of an island-to-shore skyway replacement bridge.

Suspension Bridge Design

The suspension design is a commonly used design for long channel crossings and has been used previously in the Bay Area on the Golden Gate Bridge and the SFOBB West Span. A classical suspension bridge has cables that are draped from towers and connected to anchorages on either side of the bridge. Vertical cables support the bridge by connecting the draped cable to the bridge deck. Poor ground conditions exist in the East Span Project area, making use of anchorage structures difficult or infeasible. A self-anchored suspension design variation is being considered. In a self-anchored suspension bridge, the cables are linked to the ends of the bridge deck, eliminating the need for anchorage structures (See Figure 2-13 in Appendix A). The single-tower self-anchored suspension design variation suspends the bridge from a single steel tower. Alignment constraints for the self-anchored suspension design

variation are similar to those described for the cable-stayed design variation. Decks of the bridge structures must be almost parallel and at the same approximate elevation for the entire length of the main span. The main span cannot begin until each deck alignment meets these constraints. Although a self-anchored suspension bridge looks similar to more conventional suspension bridges, the bridge deck, as an integral structural component, requires unique engineering design. The replacement alternatives under consideration have been set to accommodate the geometric requirements for a self-anchored suspension design variation.

The self-anchored suspension main span would cost about $175 million more than the total estimated cost of an island-to-shore skyway replacement bridge.

Skyway Design

The skyway design variation is a structure constructed of either concrete or steel, supported from under the bridge by piers. With this structure type, each bridge would be constructed as a separate, independent structure. Under the skyway design variation, spans over the navigation channel area could be a maximum of 150-170 meters (490-550 feet) in length. The skyway design variation would require three spans in the main span area, compared to two spans for both the cable-stayed and self-anchored suspension design variations. The skyway does not require a tangent or straight section over the main span which is needed to construct the cable-supported design variations. The N-2, N-6, and S-4 replacement alternatives have been set to accommodate any of the three design options. An example of a skyway structure is depicted in Figure 2-14 in Appendix A.

The skyway design variation is considered as the baseline for cost comparative purposes.

2.4 COMPARISON OF ALTERNATIVE CHARACTERISTICS

2.4.1 Funding and Costs

Funding

The base budget for the East Span Project, established in Section 188 of the California Streets and Highways Code (CSHC), is about $1.3 billion. Project funding comes from a combination of state taxes, bond revenues, and moneys collected through a one dollar bridge toll surcharge effective January 1, 1998, on all state-owned bridges in the Bay Area. State taxes, in the form of state fuel tax revenues, are 36.5 percent of the project budget. State Seismic Retrofit Bond revenues will fund 27 percent of the budget, and the toll surcharges from state-owned Bay Area toll bridges will fund the remaining 36.5 percent.

The legislation creating the funding mechanism for the East Span Project established the Bay Area Toll Authority (with the same board as the Metropolitan Transportation Commission) and authorized the Authority to collect the one dollar toll surcharge for eight years, issue revenue bonds, and allocate revenues to toll bridge projects, including the East Span Project. The Authority may also choose to extend the one dollar toll surcharge for an additional two years beyond the eight years to fund the

inclusion of specified amenities. Extension of the toll surcharge for two years is anticipated to generate $230 million. Amenities specified in the funds outlined in Section 188.10 of the CSHC include cable suspension design options for the main span, provision of a bicycle facility, and funding for Transbay Transit Terminal improvements. Assembly Bill 2038, recently approved by the legislature, extends the period for the toll surcharge in order to fund a pedestrian/bicycle path on the SFOBB West Span. This results in $1.5 billion potential construction budget for the SFOBB East Span Project.

The total base budget of $1.3 billion includes an allocation of $100 million for a cable-supported structure. The type of cable-supported structure is not specified in the CSHC. The design options presented in Section 2.3 include cable-supported structures. Funding of a cable-supported system costing more than $100 million would require the Authority to extend the one dollar toll surcharge beyond the initial eight-year period.

Cable-supported design variations are included in the East Span Project description of replacement alternatives. Potential impacts of these design options are addressed in this document.

Costs

Estimated total costs for each of the alternatives identified above are listed in Table 2.4-1. Comparative life-cycle costs are presented in Table 2.4-2. The cost estimates are conceptual and are based on available information about the existing East Span, new proposed alignments, existing utilities, and various local supplier and contractors' quotations.

The project costs range from zero for the No-Build Alternative to $1.65 billion for Alternative N-6, suspension design option. No-Build Alternative costs do not include the $19 million interim retrofit improvements that are currently under way. The estimated construction cost of the Retrofit Existing Structure Alternative is $0.9 billion.

Based on a comparative cost study, prepared by Caltrans in 1996, it is estimated that the maintenance costs for the retrofit alternative would be $44 million over the projected 50-year life span of the structure. Life-cycle costs of replacement alternatives have not been developed for the projected 150-year life spans of the structures. A comparison of selected maintenance operations and repairs of the first 60 years of service indicated that differences among replacement alternatives are small (see Table 2.4-2). Comparing the life-cycle costs of the replacement structure to the maintenance costs of the retrofit structure means that a new bridge, which would last 100 years longer, would be less expensive to maintain over the long term.

Table 2.4-1 Cost Estimate Summary

Alternative	Retrofit Existing Structure	Skyway ($ billion)			Cable-stayed Main Span Design Variation ($ billion)			Self-Anchored Suspension Design Variation ($ billion)		
Alignment		N-2	N-6	S-4	N-2	N-6	S-4	N-2	N-6	S-4
Structure and Roadway (1)	0.90	1.26	1.25	1.27	1.36 - 1.46	1.35 - 1.45	1.41 - 1.48	1.43 - 1.50	1.40 - 1.55	1.45 - 1.51
Dismantle Existing East Span	N/A	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Pedestrian / Bicycle Path	N/A	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Aesthetic Lighting	N/A	N/A	N/A	N/A	0.012	0.02	0.012	0.015	0.02	0.015
TOTAL Construction Cost ($2002)	0.90	1.36	1.35	1.40	1.46 - 1.56	1.45 - 1.55	1.49 - 1.57	1.46 - 1.64	1.50 - 1.65	1.49 - 1.64

Source: SFOBB East Span Seismic Safety Project 30% Type Selection Report, Caltrans, May 1998 and Parsons Brinckerhoff, May 1998.

Notes: (1) Cost estimates reflect the potential range in construction costs depending on skyway structure type rounded to the nearest 50 million. A haunched concrete skyway structure is estimated to have the least cost, a uniform depth concrete skyway a mid-range cost, and a uniform depth steel structure the greatest cost.

Table 2.4-2 Comparative Life-cycle Costs[1,2] ($ Million Escalated to 2002)

Skyway	Cable-stayed Main Span Design Variation	Self-anchored Suspension Design Variation
11	14	12

Source: SFOBB East Span Seismic Safety Project 30% Type Selection Report, Caltrans, May 1998 and Parsons Brinckerhoff, May 1998.

Notes:
[1] Comparative life-cycle cost analysis estimates costs of maintenance and repair of the bridge over a projected life span (60 years) to better determine the overall bridge structure "value." A comparative analysis requires calculation of life-cycle costs of only those maintenance operations and repairs that are appreciably different for bridge design variations that are being evaluated.
[2] For purposes of comparative life-cycle costs, differences between replacement alternatives were minimal.

2.4.3 Constructibility

In addition to cost, "constructibility" provides a valuable comparison between the alternatives and options previously described. Constructibility encompasses the anticipated duration of construction, as well as any unusual delays, impacts, or risks associated with the construction process. The impact issues are discussed in Section 4.14.

The No-Build Alternative would have no construction activity. Tasks would be limited to regular maintenance.

The Retrofit Existing Structure Alternative would include constructing two new piers in Bay waters to support the main span over the navigational channel. A total bridge closure would be necessary to connect the new piers to the cantilever section. This could be accomplished at night. During other activities, lane closures would occasionally be necessary. The closure of lanes would be timed to affect bridge users as little as possible. The Retrofit Existing Structure Alternative may require mitigation to reduce noise levels at U.S. Navy and USCG facilities on YBI during retrofit activities, especially during nighttime construction.

For the three replacement alternatives, most of the new bridge crossing the Bay can be constructed without affecting the existing roadways and bridge structure. However, multi-staging and detours will be required on YBI and the Oakland shore. Some short-term closures and total bridge closures may be required during nighttime and off-peak traffic hours to connect detour structures at YBI. Nighttime construction may require mitigation to reduce noise levels on YBI. The closure of lanes will be timed to affect bridge users as little as possible.

The Retrofit Existing Structure Alternative could impact the main navigation channel, which could be blocked completely or at least seriously impeded for over a year. For the replacement alternatives, construction could affect navigation through the channel,

but a clear channel of at least 91 meters (300 feet) would be maintained throughout the construction period.

2.4.4 Ability to Address the Project Purpose and Need

The No-Build Alternative would not meet the project purpose and need as described in Chapter 1 because it would not provide a lifeline vehicular connection between Oakland and YBI; would not maintain high levels of people, freight, and goods movement following and MCE; and would not correct deficiencies in design standards. The Retrofit Existing Structure and replacement alternatives would meet the project purpose and needs to varying degrees as summarized below.

The Retrofit Existing Structure Alternative would retain the vehicular connection between YBI and Oakland; it would also maintain the current vehicular capacity of the East Span. It would improve the seismic performance of the existing structure, enabling the bridge to withstand a seismic event, and potentially an MCE. In the event of an MCE, it is anticipated that damage could occur to truss members in the steel superstructure.

Although the Retrofit Existing Structure Alternative would upgrade the existing structure to provide for safety of bridge users during an MCE, it would not meet lifeline criteria. Post-earthquake repair or replacement of the main span could require closure of the SFOBB for several months, removing the SFOBB as a transportation link and impeding the bridge's ability to provide emergency relief access.

Opportunities to improve operational safety elements of the East Span would not be possible under the Retrofit Existing Structure Alternative. The retrofit alternative would not permit changes to the existing bridge; therefore, current roadway design standards could not be attained (see Section 1.2.3).

Each of the replacement alternatives would continue to provide a connection between YBI and Oakland and would provide a lifeline connection between West and East Bay communities. The replacement alternatives would be constructed to withstand an MCE, providing for safety of bridge users during an earthquake. As a lifeline structure, under the replacement alternatives, the span would continue to provide a critical connection between San Francisco, the East Bay, and the I-80 corridor to the east. The span would provide a high level of post-earthquake transportation service for emergency response and support for the economic livelihood of the Bay Area.

Replacement alternatives would maintain existing vehicular capacity on the East Span by providing five travel lanes in each direction. Replacement alternatives would be designed to current design standards, including provision of standard 3.6-meter (12-foot) wide traffic lanes and inside and outside (3-meter [10-foot]) shoulders. The replacement alternatives would also conform to current horizontal and vertical alignment, superelevation, clearance, and stopping sight distance standards as defined in Section 1.2.3 of this report.

2.5 ACCOMMODATION OF MULTI-MODAL STRATEGIES

The SFOBB is within the Transbay Corridor, an important corridor of transbay travel between San Francisco and the East Bay. The bridge is currently a multi-modal highway facility that is used by private vehicles, trucks, buses, carpools, and vanpools. The corridor is also served by BART, which provides rapid rail service via the submerged BART "tube," and a network of ferries.

Currently, approximately 34,000 people travel through the Transbay Corridor during the weekday peak hour in the peak direction (westbound). The following table summarizes existing person trips in the Transbay Corridor by mode:

	Single-/ Double-Occupant Vehicles	Carpools/ Vanpools	Buses	BART	Ferries	Total
Number of Person Trips (a.m. peak hour, westbound)	8,900	8,200	2,800	14,000	200	34,100

Source: Caltrans, April 1996 and April 1998.

Because the SFOBB is a critical regional facility whose approaches are severely congested during peak periods, the feasibility of incorporating an additional high-occupancy transportation facility within the corridor (either road- or rail-based) was evaluated as part of the East Span Project alternatives definition process. The purpose of such a facility would be to increase mobility within the corridor.

The evaluation focused on the feasibility of implementing an HOV lane or a rail system on the SFOBB. The evaluation determined that the near-term implementation of either the road- or rail-based high-occupancy transportation multi-modal strategy would be constrained by several factors. Planning, funding, and implementing new transit services, which would be integrated with the existing transportation system in the Bay Area, would take longer than the East Span project will take to build. Implementing an HOV lane or rail-based transit facility on the East Span without additional infrastructure improvements would adversely impact traffic operations on the approaches at either end of the bridge.

2.5.1 Historical Background

Rail service was provided on the SFOBB from 1939 to 1958 by the Key System. The Key System was an electrified interurban light-rail system that utilized the south side of the lower deck of the East and West Spans of the SFOBB. It shared the lower deck with trucks and buses while automobile traffic traveled in six lanes on the upper deck. The Key System commenced operation in 1939 and continued service until 1958. Between 1939 and 1941, two other rail lines, the Interurban Electric and the Sacramento Northern, also operated on the SFOBB.

The Key System connected Oakland and Berkeley with San Francisco. The system terminated in San Francisco at the Transbay Transit Terminal where passengers could transfer to the San Francisco Muni system. In total, the Key System trains operated on 106 kilometers (66 miles) of track on the SFOBB and in the East Bay. It served the East Bay cities of Richmond, El Cerrito, Albany, Berkeley, and Oakland. The Key System also operated transbay buses.

Patronage on the Key System peaked in 1945 with 26.5 million annual passengers, with an average daily ridership of about 102,000 (including both trains and Key System buses). By 1957, ridership had declined to about 5.2 million annually (about 17,000 average daily riders).[1] As a result of the decrease, the Key System rail lines were abandoned, and the routes were converted to AC Transit bus service in 1958.

When Key System rail service ended, the lower deck of the SFOBB was converted to automobile use. To accommodate these changes, substantial modifications were made in San Francisco, on the SFOBB and in the Oakland Touchdown area. New vehicle access to and from the SFOBB was constructed in San Francisco; tracks at the Transbay Transit Terminal were converted to bus lanes and buses were rerouted into the former rail access in the Terminal; track, ties and other railroad facilities were removed from the lower deck of the SFOBB; and new roadways to and from the SFOBB were constructed in Oakland.

2.5.2 Operational Issues

In general, the existing East Span or a replacement span could physically accommodate either of the multi-modal strategies without additional right-of-way. However, operational impacts would be associated with each multi-modal strategy, as described below.

The operational impacts associated with a multi-modal facility are described below.

HOV Lane

An HOV lane on the SFOBB was evaluated as an extension of the existing HOV facilities at the San Francisco and East Bay approaches. One of five mixed-flow lanes on the SFOBB (in both the eastbound and westbound directions) would be converted to an HOV lane. The HOV lane would be a dedicated facility for use only by vehicles with three or more persons. Because right-of-way constraints on the existing or replacement East Span would preclude the use of barriers or buffers, the facility would be separated from mixed-flow traffic by striping and signing only.

An HOV lane on the SFOBB is likely to adversely impact mobility in the Transbay Corridor, compared to the SFOBB facility without an HOV lane. During the morning peak period, the existing HOV lanes and metering signals at the toll plaza operate together as a system to ensure that the capacity of the five westbound lanes on the SFOBB is maximized. As the HOV lane volume varies during the peak period, the mixed-flow metering rates are adjusted accordingly to maintain capacity flow for five

[1] Demoro, Harre W., *The Key Route: Transbay Commuting by Train and Ferry*, 1985.

lanes on the bridge. The metering signals would release fewer mixed-flow vehicles as the excess HOV demand shifts into the mixed-flow lanes. However, the HOV volume before and after the peak hour would be less than the capacity of an HOV lane. Since mixed-flow vehicles would be restricted from using the HOV lane, total vehicular capacity would be less than the existing capacity as the excess HOV lane capacity would go unused. This would result in additional congestion on the approaches to the SFOBB. It is likely that the additional congestion would increase to the point of restricting access to the HOV lanes, particularly for the I-580 and I-880 approaches.

Other constraints associated with implementing the HOV lane on the SFOBB would be the result of the physical integration of the lane with existing HOV lanes, ramps, and SFOBB approaches. Substantial physical modifications, such as an HOV flyover (to connect the existing westbound HOV lanes, including the HOV flyover constructed as part of the Cypress project, with a new HOV lane) and/or new ramps at YBI, would be necessary to minimize impacts to traffic flow operations. Therefore, costs associated with implementation of the HOV lane could be substantial.

Rail

Conventional light-rail transit (LRT) vehicles and technology (similar to the MUNI Metro system) would be best suited for the SFOBB due to compatibility with existing MUNI LRT service in San Francisco and the short length and light weight of the trains compared to some rail technologies. BART-type trains could not be accommodated on the existing East Span structure due to the combined length and weight of vehicles. The design for the replacement structure would support lighter types of rail systems. It would not, however, be able to support heavier rial such as BART- or AMTRAK-type trains.

For this evaluation, the LRT system was assumed to connect the East Bay with San Francisco and to use the West Approach, West Span, YBI viaducts and Tunnel, and East Span of the SFOBB. The LRT westbound system could be accommodated within one lane and one shoulder, or both shoulders, of a replacement East Span. However, it would need to occupy two travel lanes on the existing West Approach, West Span, YBI viaducts and tunnel, reducing the vehicular capacity of the West Span by 40 percent. Consequently, the vehicular capacity of the replacement East Span would also be reduced by 40 percent because traffic flow on the East Span would be constrained by the lowest capacity available in the corridor. As a result, about 33,400 morning peak-period westbound person trips (4,000 morning peak-period vehicle trips per hour) would be displaced. (These figures are based on counts taken by Caltrans in April 1998 at the SFOBB Toll Plaza. The morning peak period is from 5 to 10 a.m.). If this significant loss in vehicle capacity is not made up through LRT ridership, it would increase the existing congestion levels on the approaches to the SFOBB for mixed-flow vehicles, as well as potentially creating delays for vehicles accessing the existing HOV facilities.

To maintain or increase the person throughput capacity of the SFOBB due to the loss of vehicle capacity, the LRT system must attract all of the displaced person trips (about

33,400 morning peak-period, westbound person trips).[2] The ability of the LRT system to attract new transit trips is not solely dependent on the SFOBB segment; instead, the LRT system must provide a superior mode choice in terms of travel time, convenience, cost, and reliability compared to driving. It must also not duplicate service already provided by either AC Transit, BART, or ferries. These factors would limit the number of displaced person trips to be attracted to the LRT system. Further, to be successful, any new rail system would need a supporting feeder infrastructure. Rail lines, terminals, parking areas, and new bus lines would need to be developed to deliver riders to the system. Future improvements on the other existing modes would also affect new rail system ridership by providing capacity increases in the corridor. The implementation of BART's Advanced Automatic Train Control (AATC) will allow BART to increase its capacity to 21,000 passengers during the peak hour. The AC Transit Transbay Comprehensive Service Plan calls for 140 westbound, morning peak-hour buses in the future, about an 80 percent increase over existing levels.

Substantial traffic integration issues related to the SFOBB and its approaches would be associated with implementation of an LRT system on the SFOBB. High costs would also be incurred for planning, constructing, and operating the system, on the order of several billion dollars. In addition, the rail system would be likely to terminate at the Transbay Transit Terminal in San Francisco. This would result in a substantial reduction in bus capacity at the terminal, requiring the development of a new bus terminal to maintain existing bus capacity.

Although multi-modal strategies were evaluated as part of the alternatives definition process, no multi-modal strategies are within the purpose and scope of the SFOBB East Span project. The project's purpose is to provide a seismically upgraded vehicular crossing between YBI and Oakland. This vehicular connection would maintain the current vehicular capacity of the existing East Span. The implementation of any multi-modal strategy on the SFOBB would be subject to independent evaluation and funding as a separate project in the future. The SFOBB East Span project does not preclude the implementation of an HOV lane or a rail system on the East Span in the future. Not all rail systems could be accommodated by the East Span project; however, the East Span project does not create any additional obstacles to implementing a rail project, or other technologies, in the Transbay Corridor in the future.

2.5.3 Institutional and Funding Issues

Institutional and funding issues related to implementation of either road-based or rail-based multi-modal strategy are summarized below.

[2] A Transbay Corridor LRT system with a passenger capacity of 6,500-7,500 passengers per hour per direction could offset the displaced person trips if all train cars were filled to capacity. Such a system could have the following characteristics: units with a maximum capacity of 135-155 passengers per train, trains of up to four vehicles in length, and peak-period headways of five minutes or less. A Transbay Corridor system may have different characteristics depending on the technology and equipment chosen for the system. It is important to note that it is not known without further study if ridership on a Transbay Corridor would reach capacity levels.

- **The multi-modal strategies have not been identified as necessary in any regional planning process or document.** The Metropolitan Transportation Commission (MTC) is the regional agency responsible for programming, transportation planning, and financing within the nine-county San Francisco Bay Area. It functions both as the Region Transportation Planning Agency (RTPA) and as the region's metropolitan planning organization (MPO). These designations are mandated through state and federal legislation, respectively.

  The SFOBB is a component of the I-80 Corridor, an important corridor in the Bay Area for commute travel, freight movement, and recreational travel. It has been studied extensively by regional planning organizations such as the MTC and local transit agencies. These studies include MTC's *Bay Crossing Study* (1991), *Year 2005 HOV Lane Master Plan* (1990), *Interstate 80 Corridor Study* (1987), and *Phase I ACR 132 Intercity Rail Corridor Upgrade Study* (1989); the Greater East Bay Rail Opportunities Coalition's *Commute Rail Operating Plan* (1994); AC Transit's *Alternative Modes Analysis* (1993), and *Transbay Comprehensive Service Plan* (1998); and Caltrans' *Rail Passenger Program Report 1993/94 - 2002/03* (1993). These studies identified existing and future system deficiencies and travel demand and evaluated improvement strategies, such as high occupancy vehicle (HOV) lanes (a road-based system), improved ferry service, light-rail transit (LRT) corridor identification, and commuter rail service. None of these studies has identified an HOV lane or a rail-based system on the SFOBB as a preferred improvement strategy, although AC Transit has requested that Caltrans study an HOV lane on the SFOBB. Caltrans evaluated such a facility in October 1994.[3] Furthermore, now there is no thorough understanding of what a new rail system would cost, the area it would serve, the environmental impacts of such a system, or the timeframe that would be required for implementation.

  Because none of these studies has identified an HOV lane or rail on the SFOBB as a preferred strategy, neither of these multi-modal strategies has been included in either the Track 1 or Track 2 project lists of the MTC's 1994 Regional Transportation Plan (RTP) or its 1996 update.[4] The planning horizon for the RTP is 20 years. MTC could include the multi-modal strategies in subsequent RTPs if the projects are consistent with local and regional objectives and strategies for congestion management.

- **No funding has been programmed or identified for either strategy.** Based on current per mile costs of building comparable light-rail systems ($40-45

[3] Caltrans District 4 Highway Operations, *Effects of Proposed Changes to Bay Bridge HOV Operation*, October 19, 1994.

[4] The Regional Transportation Plan, which MTC prepares, is a comprehensive guide for the development of mass transit, highway, airport, seaport, railroad, bicycle, and pedestrian facilities within the Bay Area. Track 1 refers to the list of regional transportation projects committed to in the past, as well as projects that maintain and operate the existing transportation infrastructure. Track 2 projects are regional transportation projects that do not yet have regional consensus or complete funding. MTC also allocates state and federal funds for transportation projects based on compatibility with this plan. The RTP is updated every two years through a public participation process to reflect a changing funding picture and the changing status of projects in Track 1, as well as to address new findings that emerge from corridor studies and Track 2 consensus building.

million per mile), MTC has estimated that the cost to replicate the Key System would be $2.6-3.0 billion (exclusive of modifications to the YBI Tunnel, the West Span, and access facilities in San Francisco from the SFOBB to the Transbay Transit Terminal and operating subsidies). The implementation of heavy rail would substantially exceed the cost of light rail and neither the existing East or West Spans or the replacement East Span as it is being designed, could accommodate heavy rail.[5] No cost estimates have been prepared for implementation of an HOV lane on the SFOBB but they would be likely to be less than rail. Costs may include modifications to existing ramps or construction of new ramps; these costs may be substantial.

The construction and operation of the facilities required to implement an HOV lane or LRT system would require additional funding and sources of funding beyond those committed to the East Span Project. Replacement bridge types and amenities for which funding has been allocated by state legislative action do not include construction of HOV or LRT systems (see Section 2.4.1, Funding). Other local, regional, state, and federal sources fund multi-modal projects. However, since costs to build, operate and maintain the existing local and regional transportation system exceed available transportation funding sources by $6.5 billion over the next 20 years, it is assumed that existing sources of revenues would remain committed in the foreseeable future to support existing transit services and expenditure priorities.[6] Commitment of new potential funding and funding sources for multi-modal projects on the SFOBB will depend on the political and economic environment in the future.

- **Both strategies would require new institutional arrangements to implement and operate the facilities.** Neither the HOV lane nor a rail system is currently identified as a regional transportation priority. Before either can be included in the RTP, new institutional arrangements would be required, such as the identification of a governing body to operate the rail system. This body would not be created until there is regional consensus and agency interest in the strategies. This consensus does not currently exist.

The East Span project's purpose is to provide a seismically upgraded vehicular crossing between YBI and Oakland. Although multi-modal strategies were evaluated as part of the alternatives definition process, no multi-modal strategies are within the purpose and scope of the SFOBB East Span project. Therefore, additional studies to evaluate alternatives to improve passenger mobility on the SFOBB, such as a Major Investment Study (MIS), were not prepared. Such a study, for some future, separate project, would be likely to address such issues as construction and operation of the facilities required to implement an HOV lane or rail system, as well as additional funding and sources of funding.

The East Span Project would maintain the current vehicular capacity of the existing East Span. The implementation of any multi-modal strategy on the SFOBB would be

[5] Metropolitan Transportation Commission, letter from William F. Hein, Deputy Executive Director, to the Honorable Quentin L. Kopp, California State Senate, August 17, 1998.
[6] Ibid.

subject to independent evaluation and funding as a separate project in the future. The SFOBB East Span project does not preclude the implementation of an HOV lane or a rail system on the East Span in the future. Not all rail systems could be accommodated by the East Span project; however, the East Span project does not create any additional obstacles to implementing a rail project, or other technologies, in the Transbay Corridor in the future.

2.6 CONSTRUCTION ACTIVITIES

2.6.1 Retrofit Existing Structure

Retrofit construction would require large-scale construction equipment and labor-intensive construction activities. Work would be sequenced outward from both YBI and the Oakland Touchdown. Construction activity would not be in progress concurrently along the entire length of the existing bridge.

A possible construction scenario for the retrofit alternative is summarized below. Activities are described for three work zones: YBI, the Oakland Touchdown area, and in-water. Additional information on construction activities and impacts can be found in Section 4.14.

Yerba Buena Island

Contractors would require construction laydown and access areas on YBI to retrofit the YBI East Viaduct and retrofit piers YB2 through YB4 and E1 (Figure 2.4-1 in Appendix A) and for construction storage and staging for the project. Construction activities on YBI are expected to include soil and rock removal to expand and supplement footings for piers on the island. At selected locations, explosives may be required for rock removal.

Equipment and materials may be delivered to the island via barges. A temporary pier would need to be constructed on the island if such an approach were used.

Oakland Touchdown Area

Construction activities for Retrofit Existing Structure Alternative at the Oakland Touchdown primarily would involve strengthening the existing bridge substructure. Land adjacent to the Caltrans right-of-way along the south side of the existing roadway would likely be required for temporary construction easements. Area needs would likely be in the range of 1-4 hectares (2.5-10 acres).

In-water

In-water construction in the navigation channel and eastward where water depth is sufficient would take place from barges. Substructure (below bridge deck) activities consist primarily of expansion of footings and pile caps at existing piers. Cofferdams would need to be constructed at each pier to provide work access. Dredging would be required to remove sediment from the cofferdams. Dredge quantities for the retrofit alternative are shown on Table 2.6-1. The Dredged Material Management Office (DMMO) has approved the project volumes, in concept, for in-Bay disposal.

Two new piers, E2A and E2B, would be constructed to support the existing cantilever structure (see Figures 2-4.1 and 2-4.2 in Appendix A). Footings would be placed into stable Bay bottom soils or rock. Blasting may be required to create a bench in the bedrock to create a seat for the new piers. Construction of the new piers would require large-scale construction equipment to drive large-diameter piles, approximately 3 meters (10 feet) in diameter, into Bay muds. Pile drivers would be mounted on deep-draft barges.

It is anticipated that retrofit activities in shallow water areas would be conducted from temporary trestles constructed adjacent to the existing East Span.

2.6.2 Bridge Replacement

Construction of any of the replacement alternatives would require use of large-scale construction equipment and labor-intensive construction activities. The construction period for the replacement alternatives is anticipated to be approximately three to five years, including dismantling the existing bridge.

Possible construction scenarios for a replacement alternative are summarized below. Activities are described for three work zones: YBI, the Oakland Touchdown area, and in-water.

Yerba Buena Island

Contractors would require construction laydown and access areas on YBI to construct all components of the span. YBI would be used for administrative offices, parking, materials storage, and related activities. Construction activities on YBI are expected to include soil and rock removal upslope on the island near the tunnel portal to build the detour and transition structures, maintenance garage, power substation, and to construct footings for piers on the island, including the backspan pier on YBI supporting the cable-supported design variations. Some rock excavation may also be needed to place footings for temporary detour structures. Explosives may be required for rock removal at selected locations. Temporary falsework bents will be constructed.

Construction activities may include drilling, forming, excavation, and use of explosives to construct new footings and columns and to retrofit the YBI East Viaduct. Additional construction activities include temporary storage, falsework (constructing falsework

Table 2.6-1 Dredging Quantities

Alternative	Activity																	
	New mainspan piers		Dredged material for in-Bay disposal to construct piers and footings		Construction access for new structure (1)				Removal of piers to mudline		Dismantling access (2)				**Total**			
					Lower Limit		Upper Limit				Lower Limit		Upper Limit		**Lower Limit**		**Upper Limit**	
	CM x1000	CF x1000	CM x1000	CF x1000	CM x1000	CF x1000	CM x1000	CF x1000	CM x1000	CF x1000	CM x1000	CF x1000	CM x1000	CF x1000	**CM x1000**	**CF x1000**	**CM x1000**	**CF x1000**
Retrofit Existing Structure	6.9	243.7	61.0	2,154											**61.0**	**2,154**	**61.0**	**2,154**
Replacement Alternative N-6 Suspension Span			32.2	1,137	172.5	6,092	384.6	13,582	78.2	2,762	61.2	2,161	204.0	7,204	**187.7**	**6,629**	**542.6**	**19,162**
Replacement Alternative N-6 Cable-Stayed Span			32.2	1,137	172.5	6,092	384.6	13,582	78.2	2,762	61.2	2,161	204.0	7,204	**187.7**	**6,629**	**542.6**	**19,162**
Replacement Alternative N-6 Skyway			32.2	1,137	172.5	6,092	384.6	13,582	78.2	2,762	61.2	2,161	204.0	7,204	**187.7**	**6,629**	**542.6**	**19,162**
Replacement Alternative N-2 Suspension Span			30.6	1,081	172.5	6,092	384.6	13,582	78.2	2,762	61.2	2,161	204.0	7,204	**186.1**	**6,572**	**541.0**	**19,105**
Replacement Alternative N-2 Cable-Stayed Span			30.6	1,081	172.5	6,092	384.6	13,582	78.2	2,762	61.2	2,161	204.0	7,204	**186.1**	**6,572**	**541.0**	**19,105**
Replacement Alternative N-2 Skyway			30.6	1,081	172.5	6,092	384.6	13,582	78.2	2,762	61.2	2,161	204.0	7,204	**186.1**	**6,572**	**541.0**	**19,105**
Replacement Alternative S-4 Suspension Span			33.7	1,190	172.5	6,092	384.6	13,582	78.2	2,762	61.2	2,161	204.0	7,204	**189.2**	**6,682**	**544.1**	**19,215**
Replacement Alternative S-4 Cable-Stayed Span			33.7	1,190	172.5	6,092	384.6	13,582	78.2	2,762	61.2	2,161	204.0	7,204	**189.2**	**6,682**	**544.1**	**19,215**
Replacement Alternative S-4 Skyway			33.7	1,190	172.5	6,092	384.6	13,582	78.2	2,762	61.2	2,161	204.0	7,204	**189.2**	**6,682**	**544.1**	**19,215**

(1) - Source: EKM Engineering, 7/28/98. (2) - Source: T. Y. Lin International, 9/8/98.

underneath the cast-in-place-concrete structures), cutting of the existing structure, pile driving, dismantling, concrete batch plant operations, utility relocation, and temporary detour structures. Explosives may be required to remove existing bridge piers. Maintaining access for current activities and construction workers and equipment may require temporary reconfiguration of existing roadways, particularly if construction activities require closure of Macalla Road underneath the existing and replacement structures.

Equipment, materials, and work crews may be delivered to the island via barges and other transport vehicles, requiring construction of vessel mooring facilities on the island.

Oakland Touchdown Area

Construction activities for replacement alternatives in the Oakland Touchdown area primarily would be paving, traffic maintenance, excavation of buried rubble and riprap, demolition of some existing roadways and structures, and construction of temporary access trestles, earthen fill, or through dredging in shallow water to provide barge access to the shoreline of the western edge of the Oakland Touchdown area. Bridge structures near the Oakland Touchdown area shoreline would be constructed by pile driving and placement of footings potentially requiring the use of pile-driving equipment from land, trestle, or barge access as described above. Roadways leading onto the structures at the Touchdown could encroach into existing mudflats or Bay waters (northern alignments). These approach structures, which may be partially on the Touchdown and partially encroaching into mudflat areas, would be constructed on concrete slabs supported by piles or imported fill. Excavation of the area could occur to remove riprap or buried fill prior to pile construction. A riprap shoreline would be constructed along the edge of the alignment near the existing shoreline where the bridge elevation is approximately 5 meters (16 feet) above MSL.

Land adjacent to the Caltrans right-of-way on the south side of the existing roadway would likely be required for temporary construction easements. While the amount of area cannot be determined until construction methods are determined, it is likely the construction yard would occupy 1-4 hectares (2.5-10 acres).

In-water

Most in-water construction would take place from barges. Special barges and lifting equipment to accommodate heavy equipment needed to support large-scale pile driving and other equipment needed for large bridge construction would be used. Substructure (below bridge) activities would consist primarily of cofferdam construction (vibrating in sheet piles), dewatering, placement of piles into stable Bay bottom soils or rock, and pile caps at the surface of the water. Explosives (in and out of water) may be required to create a bench in bedrock to create a seat for the main span tower foundation for cable-supported design variations, or for piers for the skyway main span. Construction of piers adjacent to YBI, including the main span tower for the cable-supported design variations, would require Bay bottom rock removal to secure the tower foundation. Construction would require falsework in the water and in the main navigation channel. Construction of the main span tower and piers would require large-scale construction equipment to drive large-diameter piles. Floating cranes and tower cranes would be required to construct the main tower and lift the superstructure.

Pile drivers would be mounted on deep-draft barges. Barge-mounted concrete batch plants may be used to pump concrete up to new structures. A minimum water depth of 3.6 meters (12 feet) would be needed to provide barge access.

It is expected that cofferdams would be constructed and/or cast-in-steel shell piles would be driven as methods to construct piers. Where piles are driven, mud would be removed from the piles and replaced with concrete pumped from barges. Excavated materials would be disposed of at appropriate locations. Dredge quantities for the build alternatives are shown on Table 2.6-1. Approval of the dredging plan would be required by the Dredged Materials Management Office, which represents state and federal agencies responsible for managing dredging activities in the Bay.

Superstructure (above column tops) construction would require lifting superstructure components, such as girders and bridge deck materials, from barges onto the bridge deck. Delivering long-span girders and lifting them into place would require deep-draft barge access. For a portion of the main span, the superstructure would be delivered to the YBI, set on the shore, and lifted with land cranes. Concrete would be pumped to the bridge deck into forms suspended over the water.

As noted above, in shallow water areas adjacent to the Oakland Touchdown area, trestles, earthen fill, or barges may be used to provide construction equipment access. The use of trestle or fill would provide temporary access into the water for construction equipment.

Dredging would be required for portions of each of the replacement alignments to accommodate barge access because portions of these alignments have water depths shallower than a standard draft barge.

2.6.3 Dismantling of the Existing SFOBB East Span

Dismantling the existing SFOBB East Span would be required to provide land connections to the new span for replacement alternatives at YBI and the Oakland Touchdown area. Removal of the entire bridge would be required by the USCG. The Coast Guard Bridge Administration Manual, Commandant Instruction M16590.5A, requires... "that any part of bridges which are replaced (except those parts incorporated into the new bridge) be removed down to the natural bottom of the waterway..." (See USCG letter dated August 12, 1998, in Appendix G.)

The existing bridge, access trestles, and temporary falsework would be removed under the replacement alternatives. There are two significant physical constraints affecting the dismantling task. First is the proximity of the replacement alignments to the existing spans, which would necessitate performing most marine activities from one side. Secondly, the shallow water depths beneath the spans as they approach the Oakland Touchdown area would require developing special barges or dredging along one side and underneath for deeper draft barge access.

There are seven dismantling activities that involve major components of the bridge:

- YBI Viaduct

- YBI shallow truss approach spans
- Cantilever truss spans
- 55-meter (509-foot) steel truss spans
- 88-meter (288-foot) steel truss spans
- Oakland shore
- YBI detour structures

Major dismantling activities are discussed below and shown on Figure 2-15 (Appendix A).

Superstructure

Removal of deck structures could be performed by separating them into pieces or by removing them panel by panel. Steel truss spans over the water near the Oakland shore could be removed in several different ways. One method is to construct temporary supports under the span and disassemble the truss segment by segment. The shallow water and low clearance under the deck near the Oakland Touchdown make the dismantling impossible by conventional barge and crane methods. Other methods to remove the steel trusses near the shoreline include dredging for barge clearance, constructing access embankments, or using special shallow-draft barges or rigging devices for sliding 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 disposal site. The temporary detours on YBI (described in Section 2.6.4 below) would be designed for erection and removal with relatively light equipment.

Substructure

Large structural elements could be lifted from their bases in one piece or piece by piece. Demolition of the concrete foundations at the piers would require reducing the reinforced concrete to pieces that are small enough to be hauled away. This could be done by mechanical means, by a chemical method that causes the concrete to expand and break apart, or by use of explosives. Removal of the piers to below the mud line could be done by an underwater demolition method or by constructing cofferdams at each pier.

The underwater demolition method includes the removal of concrete using chemical methods or explosives placed by divers. Reduced concrete sections would be removed by mechanical means. The cofferdam method includes construction of a cofferdam around the pier, dewatering, and removal of concrete with jackhammers, concrete saws, drills, and corers. Use of cofferdams is assumed for purposes of estimating dredge disposal quantities generated by existing bridge removal (see Table 2.6-1.)

2.6.4 Detour Structures on Yerba Buena Island and Oakland Touchdown Area

Detour structure options are designed to reroute traffic around the existing structure on YBI and the bridge structures at the Oakland Touchdown area. They would be in place

for up to two years (including construction and demolition), depending on traffic routing and construction staging requirements.

Yerba Buena Island

On YBI, the detour structures would route traffic around the construction area while portions of the existing East Span are demolished and a new transition structure is completed where the existing bridge now stands. The detour structures would allow the replacement structures to be connected to the retrofitted YBI East Viaduct while minimizing impacts to traffic. For all detour options, it is expected that modifications to the YBI East Viaduct would require off-peak bridge and lane closures to accommodate demolition traffic changes and other construction activities, including final tie-in. Closures would be timed to minimize inconvenience to bridge users.

The N-2 and N-6 Replacement Alternatives detour structure options are located entirely on land and range in length from 580 meters (1,902 feet) to 480 meters (1,574 feet). Only one detour configuration is feasible for Alternative S-4 (see Section 2.7.10 for discussion of YBI temporary detour options that were considered and subsequently withdrawn from further consideration. The S-4 Alternative detour structure would range in length from 400 meters (1,312 feet) to 450 meters (1,476 feet). The S-4 Alternative, North-South Detour, would require placing three temporary piers immediately offshore from YBI. The following is a description of the detour structure options. (See Figures 2-16.1 through 2-18.1 in Appendix A.)

Replacement Alternatives N-2 and N-6 North-North Detour Options

Eastbound and westbound detour structures would be located north of the YBI transition structure and existing East Span. (See Figures 2-16.1 and 2-17.1 in Appendix A.) The detour structures would be side by side in this option. Both eastbound and westbound traffic would be routed to and from the detour structures onto the new bridge.

Replacement Alternatives N-2 and N-6 North-South Detour Options

Under this option, the westbound detour structure would be constructed north of the transition structure and existing East Span. Westbound traffic would be routed from the new westbound bridge structure onto the detour structure to the YBI Tunnel. The eastbound detour structure would be constructed south of the transition structure and existing bridge (see Figures 2-16.2 and 2-17.2 in Appendix A). Eastbound traffic would exit the tunnel on to the eastbound detour structure and connect to the lower deck of the modified existing bridge which would continue to carry eastbound traffic during construction.

Replacement Alternative S-4 North-South Detour Option

The westbound detour structure would be constructed north of the transition structure and existing bridge. Westbound traffic would be routed from the existing East Span to the detour structure, then back to the tunnel. The eastbound structure would be placed south of the transition structure and existing East Span (see Figure 2-18.1 in Appendix A). Eastbound traffic would exit the tunnel, transition to the eastbound detour structure and to the existing lower deck, which would continue to carry eastbound traffic during the remainder of the construction period.

Oakland Touchdown Area

Construction staging at the Oakland Touchdown area has been defined by environmental and construction constraints. All detouring of traffic will be accomplished using earthen fill on existing ground. Temporary construction easements will be required where the detour limits extend beyond the existing rights-of-way.

Temporary detour roadways at the Oakland Touchdown area would be similar for the northern replacement alternatives. Both eastbound and westbound detour roadways would be constructed to the south of their existing alignments, requiring relocation of the existing Caltrans maintenance road and use of existing U.S. Army and Port of Oakland properties. Construction sequencing would begin with the construction of the westbound approach roadway/structure and rerouting westbound traffic from the westbound detour roadway onto the new westbound structure. 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 to its original location.

Under the S-4 Replacement Alternative, traffic would remain on the existing East Span until completion of the new westbound and eastbound structures. Once the Eastbound structure is completed, eastbound traffic would be diverted from the existing bridge to the new eastbound structure and onto a temporary detour roadway on existing U.S. Army and Port of Oakland properties south of the proposed structure. Westbound traffic would remain on the existing structure until construction is completed for the westbound structure and approach. On completion of the westbound bridge approaches, roughly between stations 87 and 89 on Figure S4-4 (Appendix A), westbound traffic would be diverted to the new westbound structure.

2.7 ALTERNATIVES CONSIDERED AND WITHDRAWN

In addition to the alternatives and project features described above, Caltrans considered a range of other project alternatives which were ultimately withdrawn from further consideration for a variety of reasons. These alternatives (shown on Figure 2-19 in Appendix A) and features are described below, along with the reasons for their withdrawal.

2.7.1 Alternative N-1

Replacement Alternative N-1 is a 3,685-meter (12,087-foot) long replacement alignment located to the north of Alternative N-6. Eastward from the YBI Tunnel, the N-1 Alternative transitions from a double-deck viaduct to two parallel structures. The transition structure, from double-deck to parallel single-deck structures, is positioned over YBI. The alternative meets project design criteria and accommodates a main span cable-stayed, self-anchored suspension, or skyway design option. A pedestrian/bicycle path could be constructed as part of Alternative N-1.

The N-1 alternative was defined, in part, to respond to recommendations from the MTC Bay Bridge Design Task Force Engineering and Design Advisory Panel (EDAP) calling for an alignment that arced northward to maximize San Francisco skyline views for westbound bridge users and panoramic East Bay Hills and Oakland skyline views for eastbound users.

Alternative N-1 was defined as the northernmost alignment capable of providing skyline views while avoiding Bay bottom zones associated with the ancient Temescal Creek bed. This geologic zone contains deep mud layers. However, based on geologic data obtained after setting the N-1 alignment, it was determined that approximately one-half of the N-1 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.

Although Alternative N-1 could be designed to maintain a lifeline vehicular connection in the event of an MCE, construction of the alternative would increase construction schedule and cost without providing substantially enhanced panoramic views when compared to other northern alternatives. Alternative N-1 was withdrawn from further consideration, and additional northern alignments were analyzed for their ability to maximize user views while avoiding undesirable Bay bottom geologic zones.

2.7.2 Alternative N-3

This alternative, along with Replacement Alternatives N-4 and N-5, was defined through further refinements to northern alignments. Alignment studies were directed to meeting operational and safety design standards to the greatest extent possible while placing the tower for the cable-stayed or self-anchored suspension design variations close to YBI, where geologic conditions are most favorable for the tower footing.

Alternative N-3 would place the main span tower approximately 110 meters (360 feet) offshore from YBI where distance to rock is approximately 20 meters (65 feet) with limited overlay of Bay mud. Location of the tower at this site would facilitate construction schedule by reducing the amount of in-Bay excavation required.

Although tower placement would be optimized under Replacement Alternative N-3, the tower location would require the roadway horizontal and vertical alignments to be modified to less than optimum configurations, resulting in restricted site distances which affect driver response and, ultimately, roadway safety. The distance between the east YBI Tunnel portal and the tower would require the westbound alignment to begin a northward curve immediately upon exiting the tunnel, resulting in restricted sight distance for westbound drivers approaching the tunnel portal. Roadway superelevation, the angle of tilt on a horizontal curve, would be limited to one percent. These design conditions would not meet American Association of State Highway and Transportation Officials (AASHTO) current design standards, requiring application for a mandatory design exception. A design exception would also be required because the westbound on-ramp from YBI would have inadequate sight distance. The N-3 alignment would also require using asphalt to build the height of the lanes on the upper deck of the YBI East Viaduct to connect to the new structure. Based on the inability of

the N-3 Replacement Alternative to meet operational and safety design standards to the greatest extent possible, it was withdrawn from further consideration.

2.7.3 Alternative N-4

Replacement Alternative N-4 was identified through refinement of northern alignments. The N-4 alignment would place the main span tower 120 meters (394 feet) from YBI in the navigation channel. The alignment would be south of the N-1 alignment minimizing intrusion into undesirable Bay bottom geologic zones.

The N-4 alignment was a modification of the N-3 alignment which provided for a 180-meter (591-foot) tangent (straight) roadway section at the YBI Tunnel approach on the westbound alignment. This alternative was defined to prevent westbound traffic entering the tunnel portal on a curve. The N-4 alignment would meet the minimum roadway geometric operational and safety design standards. Overlay of the existing YBI East Viaduct upper deck roadway would be required to conform with the new westbound structure.

Although the N-4 Replacement Alternative met minimal operational and safety design standards, geometric requirements would push the main span tower location further into the navigation channel where distance to rock and depth of Bay mud increased significantly compared to Replacement Alternative N-3. The increased depth to the main span tower would increase project cost and lengthen construction schedule. Based on the deep water tower location, the N-4 Alternative was withdrawn from further consideration, and alternative refinement studies were advanced.

2.7.4 Alternative N-5

Replacement Alternative N-5 represented a continuation of northern alternative refinement studies. The N-5 alignment would place the main span tower 158 meters (518 feet) offshore from YBI. Compared to the alignments for Alternatives N-3 and N-4, the N-5 alignment consisted of a 6,000-meter (19,685-foot) radius curve on the westbound alignment. As with Alternative N-3, the westbound alignment would enter the YBI Tunnel portal on a curve, although the large curve radius would reduce or eliminate sight distance concerns associated with Alternative N-3. The N-5 alignment would increase the rate of superelevation to two percent, which meets minimum design standards. Pavement build-up of the existing YBI East Viaduct would be required to conform to the new westbound structure.

Based on the desire to place a tangent roadway section at the westbound alignment approach to the YBI Tunnel portal and the need to place and maintain the main span tower as close to YBI as possible, Alternative N-5 was withdrawn from consideration in favor of Alternative N-6.

2.7.5 Alternative S-1

The S-1 Replacement Alternative was defined as the most direct alignment between YBI and the Oakland Touchdown. As such, it would enter and exit the YBI East Viaduct

similar to the existing alignment, eliminating the alignment curves that would provide panoramic vistas of the East Bay hills and the San Francisco skyline.

The S-1 alternative would not meet superelevation design standards for curves at the YBI transition, requiring a mandatory design exception and affecting roadway safety. Adequate superelevation on the horizontal roadway curves could not be provided without removal and reconstruction of a portion of the YBI East Viaduct. S-1 and other southern alternatives have been proposed to reduce impacts to concepts for redevelopment planned on YBI following impending closure of Naval Station Treasure Island. Draft land use redevelopment scenarios would be affected by northern replacement alternatives. Southern replacement alternatives would use areas of YBI with more limited redevelopment potential.

The S-1 Alternative would align the replacement structures parallel to the south of the existing East Span approaching the Oakland Touchdown area. This alignment would require removal and replacement of the EBMUD sewer outfall. This 2.44-meter (8-foot) diameter outfall pipe disperses effluent treated at the EBMUD main treatment facility located immediately to the east of the project area. EBMUD engineering staff reviewed the proposed S-1 alignment and expressed concern that the construction of the replacement bridge structures could damage the outfall pipe and the transverse crossing of the outfall could cause long-term damage and increase complexity of maintenance activities. EBMUD staff determined that relocation of the outfall would be required to avoid potential conflicts. The estimated cost to relocate the outfall is in excess of $100 million. Engineering and environmental reviews likely could not be completed in time to relocate the outfall prior to start of East Span Project construction in 2000.

In response to consultation with EBMUD, Alternative S-1 was revisited. By reducing the horizontal curve radius of the structures adjacent to YBI, the S-1 alignment was modified to more closely parallel the existing East Span at the approach to the Oakland Touchdown area. The modified S-1 alignment would eliminate a transverse, in-Bay crossing of the EBMUD outfall structure by setting the alignment between the existing East Span and the outfall pipe. Although no direct conflict with the outfall structure would occur, concerns remained for construction period effects to the outfall. Further investigation revealed that proposed replacement bridge construction methods requiring dredging to allow barge access to the modified S-1 alignment could not be accommodated within the area between the existing bridge and outfall structure.

Based on the potential conflicts with the EBMUD sewer outfall, the S-1 and modified S-1 alternatives were withdrawn from consideration in favor of southern alignments that minimize or avoid potential conflict with the outfall structure.

2.7.6 Alternative S-2

Replacement Alternative S-2 represents a continuation of southern alignment studies. The S-2 Replacement Alternative provided broader radius curves at the YBI transition areas, avoiding the need for design exceptions. In response to geometric constraints,

the distance to rock suitable for tower footings would also be in excess of 61 meters (200 feet).

The Replacement Alternative S-2 would require construction of detour structures similar to those described for S-3. This raised concerns for structural integrity of the existing East Span cantilever span.

The Replacement Alternative S-2 would avoid an in-Bay transverse crossing of the EBMUD sewer outfall.

Although the Replacement Alternative S-2 would meet mandatory design standards at YBI and would avoid impacts to the EBMUD sewer outfall, it was withdrawn from further consideration due to concerns for structural integrity of the existing cantilever section raised by connection of temporary detour structures.

2.7.7 Alternative S-3

Replacement Alternative S-3 represents a southern alignment design refinement to better address operational and safety geometric design standards in the YBI transition area. Replacement Alternative S-3 was set at the YBI approach to eliminate the need for design exceptions for superelevation of roadway curves. However, meeting geometric standards would move the main span tower away from YBI to a location where distance to rock suitable for tower footings would be in excess of 61 meters (200 feet). Similar to Replacement Alternative S-1, Replacement Alternative S-3 would not provide bridge users with panoramic views.

Construction staging to maintain five lanes of traffic in each direction would require construction of temporary detour structures out to the cantilever section of the existing East Span. Further investigation indicated that tie-in of the temporary detour structures to the cantilever section would be complex and potentially could compromise structural integrity of the existing structure.

Replacement Alternative S-3 would have impacts to the EBMUD outfall structure similar to those described for Replacement Alternative S-1.

Based on inability to meet mandatory design standards for superelevation, constructibility issues for tie-in of detour structures to the existing East Span, and impacts to the EBMUD sewer outfall, the S-3 Replacement Alternative was withdrawn from further consideration.

2.7.8 Double-deck Alternative

A double-deck replacement bridge was considered early in the evaluation of replacement alternatives. The double-deck alternative could be constructed on north or south alignments. It would provide five vehicular traffic lanes in each direction and inside and outside shoulders.

Preliminary cost estimates, prepared by Caltrans in 1996, indicated the double-deck replacement alternative would be more expensive than the single-deck alternatives.

A double-deck structure would limit views for lower-level bridge users. Lower deck views would be restricted by the upper deck roadway and supports.

Concerns for seismic reliability of double-deck structures have been raised because of extensive damage suffered by existing double-decked structures in recent seismic events, particularly Loma Prieta earthquake damage to the I-880/Cypress Freeway Viaduct in Oakland and the I-480 Embarcadero Freeway in San Francisco. It was determined that a seismically reliable double-deck replacement alternative could be designed using a concept of constructing two linked structures. The upper deck would be supported by a structure straddling an independent lower deck structure. The resulting bridge substructure would be similar in mass to piers and footings for parallel structures.

Based on the inability of the double-deck structure to provide panoramic views, continuing concern that a double-deck structural system is not likely to equal single-deck structures in seismic reliability and no decrease in the amount of in-bay fill resulting from construction of a single structure compared to two parallel bridges, the double-deck replacement alternative was withdrawn from further consideration.

2.7.9 Design Variations Considered

Profile

Replacement alignment refinement studies evaluated options for the bridge profile, which is the rise in roadway elevation from the Oakland Touchdown area to the YBI East Viaduct connection. Three profile variations—level approach grade, constant grade, and elevated grade—were evaluated.

Level Approach Grade profile refers to a vertical alignment that would remain level and near the water surface from the Oakland Touchdown area and begin elevation rise as far west as possible to provide required navigation clearance of 41 meters (135 feet) and conform to the existing YBI East Viaduct. A main span cable-supported design variation would be on such a grade.

Constant Grade indicates a vertical alignment rising at a consistent grade from the Oakland Touchdown area to meet navigation channel clearance requirements and conform at YBI. A main span cable-supported design variation would be on a constant grade.

Elevated Grade modifies the constant grade design variation rise at a slightly elevated grade between the Oakland Touchdown area and the main span. A main span cable-supported design variation would be on a flat slope.

Traffic operational characteristics of each profile variation were evaluated with emphasis on the effect of roadway grade on truck speeds climbing the westbound grade. The analysis concluded that the range of a truck climbing speed difference

among the three design variations was approximately six seconds and was not a substantial differentiation among the options[7].

Because no operational benefits would result from any of the profile design variations, it was not necessary to carry profile design variations to further levels of design refinement. The aesthetic impacts of profile variations were evaluated because profile defines the line that the structures will draw across the horizon. Minor differences in the three design variations would be perceived from most views. At EDAP public meetings, a general preference was stated for the Elevated Grade profile design variation, because cable-supported main span design variations would have a symmetrical appearance from distant views and would contribute to bridge users' experience of passing through a portal.

There was no support for the Level Approach Grade because it would have the appearance of the San Mateo Bridge, which, although functional and cost-effective, is considered to be inappropriate for the character sought for the East Span replacement structure and withdrawn from further consideration. Caltrans performed a value analysis that resulted in identified significant cost savings by lowering the profile at the main span tower to a position that was similar to the Constant Grade variation and acceptable to the overall bridge architecture. Additionally, with the inclusion of a pedestrian/bicycle path constructed at the same grade as the bridge, the Constant Grade rather than the Elevated Grade would produce slightly slower downhill speeds for bicyclists and result in improved safety. The elevated profile was considered but withdrawn for structural, economic, and marginally improved pedestrian/bicycle reasons. Opportunity to review the profile in this document and make further comments as appropriate will continue through the design process.

Main Span Tower Design Variations

Cable-supported main span design variations were refined under the guidance of the EDAP. Progress designs up to the 30 percent design level for a representative replacement alignment (Replacement Alternative N-6) were developed by project team structural engineers and architects. Extensive public participation and feedback were sought as part of the EDAP review of cable-supported design variations.

Designs for main span towers presented to the EDAP included a single tower between the parallel structures and dual portal towers with interconnected parallel towers arching over each structure. Single- and dual-tower design variations were created for both the cable-stayed and self-anchored suspension design variations.

Single- and dual-tower configurations would meet seismic design criteria to provide a lifeline vehicular connection on the East Span alignment. Dual-tower configurations would require more piers and larger pile caps and footings compared to single-tower designs, increasing the amount of fill in U.S. waters and volume of Bay mud to be excavated during construction.

[7] SFOBB East Span Retrofit Project Profile Grade Analysis Technical Memorandum, Parsons Brinckerhoff, October 29, 1997.

Following evaluation of seismic safety and aesthetic considerations, the EDAP recommended that main span design variations be designed with a single supporting tower. Based on the EDAP recommendation developed with extensive public comment during public meetings held in the spring and summer of 1998, the increased impacts to U.S. waters required to construct dual towers, and the ability for all replacement alternatives to accommodate the single-tower main span design variations, the dual-tower design variation was withdrawn from further consideration.

Pedestrian/Bicycle Design Variations

Consideration of pedestrian/bicycle access options on East Span Project replacement alternatives has been accomplished through a cooperative process among Caltrans, MTC, members of the Bay Bridge Bicycle/Pedestrian Advisory Committee (BPAC), and the MTC Elderly/Disabled Advisory Committee (EDAC). Alternative configurations for a path on the East Span replacement alternatives were considered in a series of workshops hosted by Caltrans in Fall 1997 and early 1998. The outcome of the workshops, and participation by the BPAC and the EDAC in the MTC Task Force public meetings, was the development of recommendations for either:

- A single path, 4.7 meters (15.5 feet) wide and 0.3 meter (1 foot) above the adjacent traffic lanes, located on the south side of the eastbound structure; or

- Two paths, each 3.3 meters (10 feet) wide at the same level as adjacent traffic lanes, located on the north side of the westbound structure and the south side of the eastbound structure.

For evaluation purposes, Caltrans also continued evaluation of replacement alternatives with no pedestrian/bicycle path.

The BPAC presented its final recommendation to MTC that the single path on the south side of the eastbound structure be included in replacement bridge designs. Based on the expressed preference of BPAC and the MTC Task Force recommendation that toll surcharge funds be used for inclusion of a pedestrian/bicycle path on the replacement structures, the dual path and no path design variations were withdrawn from further consideration and the replacement alternatives description was modified to include the single, south side path.

2.7.10 Detour Structures on Yerba Buena Island Considered and Withdrawn

Optional configurations and locations of YBI temporary detour structures were evaluated in an effort to avoid or minimize impacts to U.S. Coast Guard and U.S. Navy facilities. Possible detour structure alignment configurations were to locate:

- both eastbound and westbound detour structures to the north of the existing East Span and each of the replacement alignments;
- the westbound detour structure north and the eastbound detour structure south of the existing and replacement structures; or,
- both detour structures south the existing and replacement structures.

Each of these configurations was analyzed for construction feasibility, impacts to YBI resources, and traffic operational impacts. Based on analysis of conceptual engineering designs for the detour options, the detour options described below were withdrawn from further consideration.

Replacement Alternatives N-2 and N-6 South-only Detour Options

The south-only detour structure would be a double-deck structure located south of the existing transition structure. Westbound traffic would travel on the upper deck of the existing bridge to the upper deck of the detour structure, then to the YBI Tunnel. Eastbound traffic would exit the tunnel onto the lower deck of the detour structure, then onto the lower deck of the existing bridge.

The south-only detour option would minimize temporary ground disturbance to U.S. Navy property on YBI, although temporary impacts to the USCG station would increase. Construction of the south-only detour options would require that an 88 meter (288-foot) section of the existing bridge be cut away and removed and replaced with a detour structure. The replacement section would be constructed on YBI then lifted in place. This replacement operation would require complete closure over a 24-hour period of the existing East Span. The total number of sequential days of bridge closure is not known, but is estimated to be in excess of one week. Because of the magnitude of the task to detach and remove the section of the existing bridge, potential for the construction period to be extended would be great.

Based on the complexity of construction and the requirement for complete closure of the entire East Span over a number of days or weeks, the south only alignment detour options were withdrawn from further consideration.

Replacement Alternative S-4 North-only Detour Option

The north-only detour option for Replacement Alternative S-4 would be a double-deck structure constructed north of the existing transition structure and existing East Span. Westbound traffic would travel on the upper deck of the existing bridge to the upper deck of the detour structure then to the tunnel. Eastbound traffic would exit the tunnel onto the lower deck of the detour structure, then onto the lower deck of the existing bridge.

The north-only detour option would be constructed as described for the south-only detour option. It was withdrawn from further consideration for the constructability and traffic operations reasons discussed for the south-only detours.

Replacement Alternative S-4 South-only Detour Option

A south-only detour structure on the S-4 alignment would be two parallel structures. Westbound traffic would be detoured from the existing bridge to the new structure and back to the tunnel. The eastbound structure would be placed south of the transition structure and existing East Span.

A south-south detour option was identified for its potential to avoid temporary disturbance to U.S. Navy properties. However, it would have placed temporary structures over residential structures at the USCG station. More detailed investigation

indicated that the south-south detour option would affect construction staging for the S-4 Replacement Alternative. Construction of the westbound detour would conflict with placement of columns for the replacement structure and construction of the eastbound deck of the replacement structure. Based on the construction phasing conflicts, the south-south detour option was withdrawn from further consideration.

Replacement Alternative S-4 North-only Detour Option

The north-only detour option for Replacement Alternative S-4 would be a double-deck structure constructed north of the existing transition structure and existing East Span (see Figure 2-18.1 Appendix A). Westbound traffic would travel on the upper deck of the existing bridge to the upper deck of the detour structure then to the tunnel. Eastbound traffic would exit the tunnel onto the lower deck of the detour structure, then onto the lower deck of the existing bridge.

CHAPTER 3
AFFECTED ENVIRONMENT

This chapter describes the physical and socioeconomic setting of the proposed SFOBB East Span Seismic Safety Project and provides the baseline used to evaluate potential impacts. The project area encompasses land between the western portal of the Yerba Buena Tunnel and the SFOBB Toll Plaza on the Oakland Touchdown area (Figure 2-2 in Appendix A). The project area includes additional land on Yerba Buena Island (YBI) to allow for construction activity related to the project. In the Bay, the project area includes sufficient area to accommodate all of the proposed alignments and allow for construction-related activity as described in Chapter 2.

In some locations, the project area extends beyond the physical limits described above, where there is potential for environmental impacts to occur beyond those limits. Project area boundaries are described within individual sections of this chapter where they differ from the boundaries shown on Figure 2-2 in Appendix A. Where the term "Region" is used in this chapter, it refers to the entire nine-county Bay Area and the I-80 Transbay corridor.

The following technical studies containing detailed information were conducted to prepare the environmental impact statement for the SFOBB East Span Project.

"Air Quality Study Memorandum," March 1998

"Bicycle and Pedestrian Access Report," September 1998

"Biological Assessment," September 1998

"Community Impact Assessment," September 1998

"Extended Study Report, Archaeological Resources," June 1998

"Finding of Adverse Effect: Built Environment," July 1998

"Finding of Effect for Archaeological Resources," July 1998

"Hazardous Wastes Assessment," September 1998

"Historic Property Survey Report," July 1998

"Location Hydraulic Study," September 1998

"Natural Environment Study," September 1998

"Noise and Vibration Study," September 1998

"Draft Relocation Impact Report," September 1998

"Traffic Circulation, Access and Parking Assessment," September 1998

"Visual Impact Assessment," September 1998

These studies are available for review at the locations listed in the Preface of this document. (Note: because the Extended Study Report, Archaeological Resources and Finding Of Effect for Archaeological Resources contain confidential information about the locations of archaeological resources, they are not available for review.)

3.1 COMMUNITY IMPACT ASSESSMENT SETTING

This section describes existing land uses in the project area and identifies and analyzes existing and projected social conditions in the project area so that the economic, demographic, service and fiscal impacts of the East Span Project can be evaluated.

Socioeconomic and demographic data are presented for the U.S. Census Tracts that are within the project area and that could be potentially affected by the East Span Project. Census Tract 4017 in Oakland includes the Oakland Touchdown area; Census Tract 179.02 includes YBI and Treasure Island (TI). To provide context for census tract data, they are compared to data for the cities of Oakland and San Francisco (YBI and TI are part of the City of San Francisco). Because the SFOBB is a regional facility, some demographic data are also presented at the county level. Figure 3-1 in Appendix A shows the Oakland and YBI/TI census tract locations in the project area.

3.1.1 Existing Land Uses in the Project Vicinity

Yerba Buena Island and Treasure Island

The existing SFOBB East Span connects to the West Span on YBI at the Yerba Buena Tunnel. The existing East Span crosses over both U.S. Navy and U.S. Coast Guard (USCG) property on the east side of YBI before it enters the east portal of the YBI Tunnel. TI is connected to YBI by a narrow causeway. YBI is a natural landform; TI and the causeway were constructed by placing fill in the Bay.

U.S. Navy. The Navy owns 47 hectares (115 acres) of land north of the East Span on YBI, as well as a small area to the south of the span at the eastern tip of the island (see Figure 3-2 in Appendix A). The Navy also owns the 163-hectare (403-acre) TI and the causeway connecting the two islands. These properties form the U.S. Navy Naval Station Treasure Island, which has operated since the 1940s. The base is now closed and as part of the Base Reuse and Closure (BRAC) process being implemented by the Department of Defense, the U.S. Navy is in the process of transferring these properties to the City and County of San Francisco (CCSF).

On YBI, U.S. Navy property encompasses all land to the north of the existing span and an additional portion south of the span lying roughly east of where Macalla Road passes underneath the span. (See Figure 3-2 in Appendix A showing property ownership on YBI.) The land uses on U.S. Navy property are primarily residential. Quarters 1 through 7 were built in the early 1900s as officers' quarters. Several of the buildings on YBI have been listed or are eligible for listing on the National Register of Historic Places. These properties are described in Section 3.10. With the exception of caretakers, the housing is now vacant.

In addition to these single-family residences, two apartment buildings, consisting of a total of 100 units, are located on the west edge of Macalla Road as it ascends from the TI causeway towards the westbound entrance ramp to the SFOBB (shown on Figure 2-16-1 in Appendix A). The units are currently vacant; however, 90 units are designated for use as residences by the Treasure Island Homeless Development Initiative (TIHDI), a CCSF program to rehabilitate housing for the homeless.

The infrastructure buildings on YBI consist of a vacant fire station (Building 213), located below Quarters 1 through 7 on the west side of Macalla Road, and a former torpedo house and mine assembly building (Building 262) located at the easternmost tip of the island.

On TI, approximately 30 military buildings are in the process of being demolished or are identified for future demolition. The remaining land uses include residential, educational, administrative/industrial buildings, recreational facilities, and infrastructure.

U.S. Coast Guard. The remaining property on YBI is owned by the USCG. It encompasses about 13 hectares (32 acres). The focus of USCG operations is a narrow half-mile strip of land at the eastern edge of the island. From this location, the USCG performs a variety of functions, including 24-hour search and rescue, law enforcement, and buoy repair and maintenance. Vessel traffic service is performed from a large communications tower at the top of YBI. Because of its search and rescue and law enforcement responsibilities, it is essential that the USCG be located at a waterfront site where boats can quickly accelerate to full speed. It is also very important for the unit to be centrally located in order to maintain adequate response times to emergency calls in the central and southern Bay.[1]

Residential facilities are provided for about 100 USCG personnel who live on-site. The Bachelors Enlisted Quarters (BEQ) encompasses 60 rooms in a group of four buildings. There are also five single-family homes on the island for the families of admirals, captains, and commanders.

USCG administrative facilities on YBI consist of the following buildings:

- Building 40 - located at the entrance of the UCSG facility. It is a two-story building used for reserve training and USCG auxiliarist functions;

[1] *Draft Group San Francisco Master Plan*, 1995.

- Building 75 - vacant;
- Building 270 - vacant;
- Station and group command offices located adjacent to the BEQ;
- A group of two- and three-story buildings located south of the buoy maintenance and repair area; and
- Vessel Traffic Service (VTS) located at the top of the YBI hill on the main deck of a prefabricated metal building.

Industrial buildings are located at the southern end of the island. Maintenance, repair, and painting of buoys for the entire Bay Area are done in this area.

Recreational facilities on the island consist of an outdoor tennis court located next to Building 75.

Oakland Touchdown Area

The SFOBB touches down in the City of Oakland on a spit of land north of Port of Oakland facilities and west of the I-80/I-880/I-580 Interchange (distribution structure). The land in this area is owned by a number of public agencies, including the City of Oakland, the State of California, and the U.S. Army. (Refer to Figure 3-3 in Appendix A.)

The State of California owns the right-of-way where the current I-80/SFOBB alignment is located. This property extends approximately 50 meters (164 feet) from the outer boundaries of the westbound and eastbound I-80 alignments and includes a median area between the two alignments.

The SFOBB Toll Plaza is located approximately 200 meters (655 feet) west of the distribution structure and extends across the westbound I-80 alignment. Toll plaza administrative facilities, maintenance buildings, a tow-truck operations base, and the SFOBB Traffic Operations Center are located south of the toll plaza within the median area. Toll plaza workers also park in this area.

A Caltrans maintenance road extends the length of the project area within the Oakland Touchdown area on the south side of I-80. The roadway continues under the SFOBB and provides access to the north side of the bridge. Burma Road is also located on the south side of the touchdown. It extends from Maritime Street to the west end of the touchdown and is roughly parallel to the maintenance road. Burma Road was constructed by the U.S. Army and is now used by the Port of Oakland under a lease agreement. This roadway is blocked to public vehicular access about 1.6 kilometer (1 mile) from the west end of the touchdown. At this point, traffic is diverted onto the Caltrans maintenance road.

Various Caltrans storage, repair, and maintenance facilities are located between the Caltrans maintenance road and Burma Road, at the west end of the touchdown. The Caltrans Bay Bridge Substation and the Key Pier Substation, which were used during the era when the bridge carried trains, are also located in this area and are currently used for Caltrans maintenance activities. An East Bay Municipal Utility District (EBMUD) final dechlorination treatment station and outfall are also located in this area. The outfall extends 5 kilometers (3.1 miles) into the Bay.

An undeveloped open storage area for Caltrans construction materials and maintenance activities extends for about 1.6 kilometers (1 mile) between the Caltrans maintenance road and Burma Road. This property is owned by the City of Oakland. A billboard owned by the Port of Oakland is located within this area. It is designated for community non-profit organizations and Oakland Airport-related media.

Four additional Caltrans buildings are located south of the SFOBB Toll Plaza and the maintenance road. The buildings are used for storage, maintenance, and repair of materials associated with general maintenance of the bridge.

South of the Oakland Touchdown Area. The Port of Oakland extends from the south side of the Oakland Touchdown area and continues south along the San Francisco Bay shoreline to the Inner Harbor between the cities of Oakland and Alameda. The Port is a highly developed area of industrial, maritime, transportation, and commercial activities. Its deep-water berths and container cranes are supported by a network of warehouses, roadways connecting to freeways, and intermodal railyards. The Port also operates numerous non-maritime-related activities along its 30 kilometers (19 miles) of shoreline, including commercial real estate, two airports, park refuges, and industrial parks.

The U.S. Army owns the property on the south side of the Oakland Touchdown area, including Burma Road. Army property extends from near the end of the touchdown eastward and includes land on the east side of Maritime Street. Until recently, the Oakland Army Base Military Traffic Management Command Center was operated within this property. Within this property, the Port of Oakland (Port) operates the Bay Bridge public terminal on the shoreline south of the toll plaza. The terminal is currently undergoing renovation to allow it to service container cargo traffic. The Army notified the Port in July 1998 that it no longer requires this property, and the Port now has four months to officially respond with an offer to purchase the property.

A container freight storage area is located between Burma Road and the Caltrans maintenance road, south of the toll plaza. AMNAV, a private shipping company, is located on the south side of Burma Road and uses Pier 8 (adjacent to the Bay Bridge public terminal) for tug services. Burma Road continues eastward where it intersects with West Grand Avenue. West Grand Avenue provides access to and from I-80. A large shipping container storage area is located on property west of this intersection.

North Side of the Oakland Touchdown Area. The strip of land on the north side of the East Span is designated as a Resource Conservation Area in the City of

Oakland General Plan.[2] The first 50 meters (164 feet) of land to the north of the bridge is owned by Caltrans; beyond this boundary, the land is owned by the City of Oakland. The Resource Conservation Area consists of tidal lowlands and mudflats that flood each day with the incoming tide. The Resource Conservation Area continues nearly 3.2 kilometers (2 miles) eastward from the touchdown before turning northward towards Emeryville.

The first 1.6-kilometer (1-mile) stretch of shoreline in Emeryville, known as the Emeryville Crescent, provides sensitive habitat for a variety of wildlife and special status species. The study area for the SFOBB seismic safety project ends at Radio Point Beach, roughly 1,000 meters (3,300 feet) from the western end of the touchdown and approximately 2.4 kilometers (1.5 miles) from the Emeryville Crescent.

3.1.2 Developable Land and Development Trends

Yerba Buena Island and Treasure Island

Yerba Buena Island. The Draft Naval Station Treasure Island Reuse Plan ("Draft TI Reuse Plan") has been developed for the Office of Military Base Conversion, CCSF, and the San Francisco Redevelopment Agency in anticipation of the closure of Naval Station Treasure Island. According to the Draft TI Reuse Plan, development on YBI may include up to 300 units of attached and detached single-family residential units as well as live/work units and artists cottages. It would also include "visitor-oriented" facilities such as lodging and conference facilities. A majority of the land will remain in open space as the island's steep terrain limits the intensity of development.[3]

Development intended for the southern half of YBI, owned by the USCG, will improve base facilities and amenities, including new residential and light industrial uses. USCG does not currently have a master plan in place.

Treasure Island. Due to present underutilization and revenue-producing potential, TI is expected to be subject to intense development over the next 20 years. The CCSF is currently preparing an EIR for TI and YBI to evaluate environmental impacts of proposed development on the property to be conveyed to the CCSF from the U.S. Navy. A market assessment in the Draft TI Reuse Plan concluded that "publicly oriented recreation and entertainment attractions" have been identified as particularly well-suited for the site.

In addition to these types of uses, the Draft TI Reuse Plan also considers land uses that would accommodate community facilities, major utilities, film production studios, and opportunities for non-profit institutions. New housing and shoreline open space on TI are also allowable uses.

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[2] *City of Oakland General Plan*, June 1997.

[3] The City and County of San Francisco, Office of Military Base Conversion, Planning Department and the San Francisco Redevelopment Agency, *Draft Naval Station Treasure Island Reuse Plan*, July 1996.

Oakland Touchdown Area

The Port of Oakland, Caltrans, and the East Bay Regional Park District (EBRPD) all have plans for development on the Oakland Touchdown area.

Port of Oakland. The San Francisco Bay Area Seaport Plan (Seaport Plan) identifies long-range plans by the Port of Oakland to expand its operations. The plan, prepared by BCDC and the MTC in 1996 and amended in 1997, calls for expansion of Port facilities over the next 20 years. Before port expansion can proceed using Bay fill, marine terminal projects must meet the criteria specified in Section 66605(c) and (d) of the McAteer-Petris Act, administered by BCDC. Expansion plans are designed to meet the projected 2020 cargo volumes estimated in the Seaport Plan. A Record of Decision (ROD) has been signed to proceed with development of the Port of Oakland's Joint Intermodal Terminal (JIT).

To meet anticipated demand, the Port is seeking acquisition of 175 hectares (433 acres) of land from the Department of Defense (DOD). There are currently three avenues available to the Port in seeking a conveyance of this property. The Base Reuse and Closure (BRAC) process would convey the bulk of the land to the Port, but would reserve a 6.5-hectare (16-acre) portion at the western end of the Oakland Touchdown area for development by the EBRPD as a public park. A second option is to utilize an agreement between the Port and the Army dated 1949, which states that all lands west of Maritime Street shall be reverted to the Port if the Army notifies the Port that it no longer needs the land and if the Port enters into an agreement to purchase the lands at fair market value. The Army notified the Port in July 1998 that it no longer requires this property, and the Port now has four months to officially respond. A third option is to allow the land to be conveyed to the California State Lands Commission, which is responsible for maintaining the shoreline for the Public Trust. Under the Burton Act, this land is designated to be developed for Port purposes.

Caltrans/Bay Conservation and Development Commission (BCDC) Permit 11-93. As part of the Cypress Replacement Project/I-880 Flyover, Caltrans is required to provide Bay access at the Oakland Touchdown area. These access areas, or overlooks, are required by BCDC to maximize public access to the western end of the Oakland Touchdown area. However, EBRPD and the Port have plans to develop a much larger public park in the same area (see below). BCDC also requires, as a permit condition, a bikeway to be located adjacent to eastbound I-80. A conceptual bikeway alignment would follow the Caltrans maintenance road and provide access to proposed scenic overlooks. If location of the conceptual overlooks and bikeway alignments prove infeasible, permit conditions require Caltrans payment of a fee in lieu of constructing the improvements.

Caltrans has interests in using a portion of the Oakland Touchdown area for maintenance access to the SFOBB.

East Bay Regional Parks District (EBRPD). The EBRPD Advanced Planning Division is reviewing lands at the Oakland Touchdown area for potential acquisition and stewardship to develop an approximately 6.5-hectare (16-acre) public park to the south

of the existing alignment. The Port of Oakland has committed to work with EBRPD in the creation of this park. If the Port were to expand its facility in the future, the Port proposes to relocate the park to the new shoreline once the placement of fill is complete.

3.1.3 Adopted Goals and Policies

Land Use Policies

The seven public agencies with jurisdiction over or interest in land use in the project area are the U.S. Navy, CCSF, BCDC, City of Oakland, Port of Oakland, USCG, and the EBRPD. This section reviews their existing policies and planning documents and identifies the guiding principles that relate to the proposed project.

U.S. Navy. The U.S. Navy is in the process of transferring the property known as Naval Station Treasure Island to the CCSF as part of the BRAC process. CCSF is currently operating under a caretaker agreement to facilitate a transition of management and maintenance of the property. The transfer of property will be completed over the next few years.

The City and County of San Francisco. The CCSF is projected to acquire ownership of TI and portions of YBI in the year 2003. A caretaker agreement between CCSF and the Navy is currently in place. The caretaker agreement defines levels of maintenance on TI during the transfer and conveyance process and defines funding and service responsibilities. The Draft TI Reuse Plan serves as the guide for future activities on TI and CCSF-owned portions of YBI.

The Guiding Policies for Land Use identified in the Draft TI Reuse Plan are as follows:

- Provide for new civilian uses that contribute to the economic well-being of the islands and San Francisco by generating jobs and revenues;
- Limit uses to those that can be accommodated primarily by ferry; and
- Allow flexibility to respond to market opportunities and changes in technology over time. Attract initial uses and users that facilitate or are compatible with the development of desired long-term uses.

The Draft TI Reuse Plan identifies the following broad categories of uses to promote the above-stated policies: Publicly Oriented Uses, Open Space and Recreation, Institutional Uses, and Residential Community.

The City of Oakland. *Envision Oakland* is the title of the 1997 Draft Land Use and Transportation Element of the Oakland General Plan. This document contains policies and actions for implementation of the community's vision for Oakland. *Envision Oakland* includes land use designations for the Oakland Touchdown area and adjacent areas.[4]

[4] The City of Oakland, *Envision Oakland* (Draft for Public Hearings), October 1997.

- The land immediately adjacent to the north of the existing touchdown is designated as Resource Conservation Area;
- The land immediately adjacent to and south of the existing touchdown is designated as General Industrial/Transportation; and
- An unspecified site within the land to be released by the Army as part of the Oakland Army Base Reuse and Closure Process, located on the southern half of the Oakland Touchdown area, has been proposed as Park and Open Space.

Transportation policies found in *Envision Oakland* reflect the City's priority to maintain exceptional access to and through Oakland for the wide variety of transportation modes that have historically existed within the city.

The Port of Oakland. The Port of Oakland is beginning development of a reuse plan to guide port expansion in the Oakland Army Base area. That reuse plan will include policies to guide development within the project area. The Port has plans for expansion that include utilizing some of the area south of the Oakland Touchdown area as a staging and storage area for shipping containers.

U.S. Coast Guard. Although the USCG regularly prepares master plans for its various facilities, the USCG facility on YBI does not currently have a master plan in place. Finalization of a draft master plan prepared in September 1995 is pending the results of the TI BRAC process, and the final design for the East Span Project. Once the final design for the East Span Project have been chosen, the amount of land required from the USCG property can be determined. The completed master plan for the USCG properties will be based upon land remaining available for development.

East Bay Regional Park District. The EBRPD Master Plan (December 17, 1996) does not discuss specific areas within the East Bay. Instead, it presents the policies and procedures to be used for acquisition and stewardship of any lands to be placed under EBRPD management. As noted in Section 3.1.2, the lands at the west end of the Oakland Touchdown area are currently being reviewed by the EBRPD Advanced Planning Division for potential acquisition and stewardship. The EBRPD has gone on record with BCDC stating its intention to develop a park on the Oakland Touchdown area.

The San Francisco Bay Conservation and Development Commission. The San Francisco Bay Conservation and Development Commission (BCDC) prepared the San Francisco Bay Plan (adopted 1969, amended 1987) which outlines policies to guide future uses of the Bay and shoreline and the maps that apply these policies to the present Bay and shoreline.

The Bay Plan makes the following recommendations which are applicable to the current project:

- Filling in the Bay should only be allowed for purposes that provide substantial public benefits and only if there is no reasonable alternative.

- Any route over the Bay will be subject to: (a) placement on structure, not fill; (b) provide navigational clearance; (c) ancillary facilities should avoid new fill if possible; and (d) new structures should consider mass transit facilities (Transportation Policy 4).

- Sedimentation resulting from dredging projects should be limited by: (a) placement on dry land; (b) placement as fill in approved fill projects; (c) barging or piping to suitable disposal sites in the ocean; or (d) if no other alternative is feasible, dumping in designated parts of the Bay (Dredging Policy 1).

- Maximum feasible public access to the waterfront should be provided and permanently guaranteed.

- Public access should be provided to some natural areas to permit study and enjoyment.

- Access to the waterfront should be provided via walkways and trails.

- Portions of YBI released from use by USCG and Navy should be redeveloped for recreational use.

- If and when the Oakland Army Base and Naval Supply Center in the City of Oakland are not needed by the military, the area should be developed for port and related industrial uses.

- New or remodeled bridges should be designed to permit maximum viewing of the Bay and its surroundings by motorists and pedestrians. Guard rails and bridge supports should be designed with views in mind.

- Towers, bridges, or other structures should be designed as landmarks. Such landmarks should be low enough to assure continued visual dominance of the hills around the Bay.

BCDC has also issued Permit No. 11-93 to Caltrans for work on the Cypress Replacement Project.[5] This permit, in response to BCDC's policies regarding maximum feasible public access, requires Caltrans, as mitigation, to create a public access pedestrian/bicycle pathway system connecting the cities of Emeryville and Oakland with the Touchdown area. These public access improvements are described in concept in the permit granted by BCDC for that project. The permit stipulates that these public access improvements are conditioned on the feasibility of construction; should construction prove infeasible, the permit provides that financial compensation would be accepted in lieu of constructing these improvements.

3.1.4 Demographic Characteristics of the Project Area and Inclusive Census Tracts

Demographic information for the two census tracts within the project study area is presented below. Detailed demographic information for the nine-county Bay Area region can be found within the Community Impact Assessment technical report.

Household Characteristics

Both YBI and TI are owned by the U.S. Government. With the exception of barracks on TI, most of the housing stock consists of apartments. Most of the units are currently vacant.

The housing stock in Census Tract 4017, which includes the Oakland Touchdown area, was 62 percent renter-occupied according to the 1990 Census. Average household size in this census tract was 2.8 people per household. The closest housing to the Oakland Touchdown is situated approximately 2.4 kilometers (1.5 miles) away.

Ethnic Mix and Age Distribution

Within the YBI/TI census tract, based on 1990 Census data, 35 percent of the population was under the age of 16 and 0.2 percent was aged 65 or older, which reflects the use of housing for military personnel and their families. In 1990, Oakland had 22 percent of its population aged under 16 and 12 percent of its population was 65 or older.

The ethnic composition of YBI/TI, according to the 1990 Census, consists of 65 percent Caucasian, 16 percent African-American, and 15 percent Asian. Data for Census Tract 4017, which contains the West Oakland neighborhoods closest to the SFOBB, indicates that 63 percent of the population is African-American. The Caucasian and Asian populations of Census Tract 4017 comprise 16 and seven percent of the area, respectively.

Jobs and Employment

The characteristics of the current TI and YBI labor force (after base closure) have not been documented. Census data for 1990 indicate that 72 percent of those employed

[5] BCDC Permit No. 11-93 issued on June 8, 1994 (with amendments made October 19, 1994, April 14, 1995, and July 31, 1998). One more amendment is expected.

at that time on TI and YBI were in the armed services. It was assumed that the remaining 28 percent is the civilian labor force employed at the base.

Almost 30 percent of the labor force in West Oakland was employed in craft or laborer positions. According to a 1995 survey, there were approximately 488 businesses/employers in West Oakland. At the time of the survey, the largest employer in the West Oakland community was the United States Postal Service.[6] One of the larger employers, the Oakland Army Base is scheduled for closure in 2001, and a reuse plan for the site is currently being developed. The West Oakland Census Tract 4017 unemployment rate in 1990 was 24 percent.

Income Levels

In 1990, the YBI/TI area had five percent of its population living at or below the poverty line. This relatively low figure is primarily due to military pay rates. With average household and per capita incomes approximately 50 percent lower than values for the Oakland as a whole, Census Tract 4017 in West Oakland exhibited characteristics of a low-income community in 1990. The proportion of the neighborhood living below the poverty level was 21 percent.

3.1.5 Fiscal Conditions

San Francisco

Primary sources of the CCSF General Fund are various taxes and state subventions. Approximately 22 percent of the 1996-97 General Fund came from property taxes, ten percent from business taxes, and seven percent from sales taxes. The remainder comes from other taxes such as motor vehicle and utility taxes, hotel taxes, traffic fines, departmental fees, and major federal and state subventions for social service and healthcare programs.

According to the Mayor's 1996-97 budget, 35 percent of the General Fund was allocated to public safety activities, 22 percent was for human welfare and neighborhood development, 19 percent went to community health, and the remainder was allocated to a variety of programs and activities, including general administration, culture and recreation, public works, transportation, and commerce.

CCSF recently developed plans for the redevelopment of TI and portions of YBI currently owned by the Navy. A large investment in infrastructure is required to support redevelopment, and CCSF has not established a way to fund the front-end investment required to encourage private investment on the islands.

Oakland

The city share of property tax which goes into the Oakland General Fund is less than 22 percent. The largest share of property tax collected in Oakland goes to Alameda County, special districts, and school districts. In the 1996-97 budget, 59 percent of the General

[6] Economic Development Advisory Board of the County of Alameda, *West Oakland 2000 Transportation and Economic Development Study*, 1997.

Fund was allocated to police and fire activities, nine percent went to public works and neighborhood development, and ten percent was for culture and recreation.

3.1.6 Community Services

Utilities

Water Supply. The San Francisco Water Department (SFWD) supplies water to TI and YBI via steel pipes attached to the West Span. Backup water supply is provided via the East Span by the East Bay Municipal Utility District (EBMUD) from a connection with EBMUD's system in Emeryville. The water reaches reservoirs on the islands via a steel pipe attached to the bridge. Both sources provide potable and fire protection water.[7] The CCSF has asked EBMUD to continue to supply water to TI and YBI since it assumed management of the islands from the Navy.

EBMUD is also responsible for water supply at the Oakland end of the bridge. It has supply pipes to the SFOBB Toll Plaza, Caltrans maintenance buildings, and throughout the Oakland Army Base property to the south of the Caltrans right-of-way.[8]

Sewer and Sewage Treatment. All wastewater generated on TI and YBI is treated at the sewage treatment plant located at the northeast corner of TI.[9]

Sewage service and treatment in the East Bay are provided by EBMUD. The treatment plant is located just south of the distribution structure. A major EBMUD sewer outfall line parallels the bridge approach to the south. Other EBMUD facilities include an effluent pump station near the toll plaza, a dechlorination facility south of the eastbound lanes approximately 183 meters (600 feet) east of the existing bridge takeoff point, and an outfall drop structure adjacent to the shoreline where the outfall transitions to the water.[10] (Refer to alignment drawings in Appendix A.)

Storm Drains. At the Oakland Touchdown, the storm drain system consists of pipes and various outfalls along the perimeter of the spit, which discharge directly into San Francisco Bay. The storm drain system consists of pipes and various outfalls along the perimeter of TI and YBI, which discharge directly into San Francisco Bay.

Electrical Infrastructure. Electrical power is provided to TI and YBI via a Navy-owned 34.5 KV submarine cable connected to the Navy's Davis Substation located at the Fleet and Industrial Supply Center (FISC) in Oakland.

In the Oakland Touchdown area, there are several electrical power lines. South of the existing SFOBB, there is a 480 KV and a 12 KV overhead line mounted on poles and owned by Caltrans and Pacific Gas and Electric Co. From the substation, the 12 KV line extends underground onto the existing SFOBB. North of the existing SFOBB, there is an underground 5 KV line running along I-80. A 34.5 KV submarine cable, owned by

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[7] *Treasure Island Reuse Plan, Physical Characteristics, Building and Infrastructure Conditions*, June 1995.

[8] Bill McGowan, EBMUD, oral communication.

[9] *TI Reuse Plan, Physical Characteristics, Building and Infrastructure Conditions*, June 1995.

[10] Jimmy Yoloye, EBMUD, oral communication.

the Navy and the City and County of San Francisco (CCSF), crosses under the existing SFOBB and proceeds to YBI and TI.

Telecommunications Infrastructure. Telecommunications service is provided to TI and YBI from San Francisco via a conduit system located on the West Span of the SFOBB.

Pacific Bell owns fiber optic cables and telephone lines located south of the existing SFOBB on YBI and in the Oakland Touchdown area and on the existing SFOBB. Three mobile phone sites are located on YBI, owned by GTE Cellular, PacBell Mobile Services, and Cellular One.

Natural Gas Infrastructure. Natural gas is provided to YBI and TI by PG&E from Oakland via a 254 millimeter (10-inch) diameter high-pressure submarine gas main.

Police and Fire

The California Highway Patrol (CHP) has jurisdiction over I-80 and the SFOBB for matters involving both traffic and emergency services. Calls from the east and west segments of the bridge are taken by CHP offices in Oakland and San Francisco, respectively. Municipal police departments are not responsible for State bridges and roads unless they are asked to participate in a specific joint investigation or action.

The Oakland CHP office is located at 3601 Telegraph Avenue, close to the interchange of I-580, 24, and I-980, and approximately 1.6 kilometers (1 mile) east of I-80 and the approach to the SFOBB. The CHP office in San Francisco is located on Eighth Street adjacent to the on- and off-ramps for the bridge. In addition, there is a police station on TI which was taken over from the Navy and has been operated by the San Francisco Police Department since late 1997.

The delivery of fire and emergency services coverage within the project area is shared by several jurisdictions due to the complexity of access to the various segments of the SFOBB and the YBI Tunnel. Fires or medical emergencies on the westbound East Span are covered primarily by the Oakland Fire Department, with assistance from the Emeryville Fire Department. Two Oakland fire stations and one Emeryville fire station are available to handle emergencies on the East Span.

In 1997, there were 68 calls to the Oakland Fire Department from the SFOBB to report vehicle fires and other fires, injury accidents, and other medical emergencies.

The San Francisco Fire Department's (SFFD) Fire Station #48 on TI has primary responsibility to cover incidents on the upper deck (westbound) of the SFOBB from the tunnel to the San Francisco anchorage and on the lower deck (eastbound) from YBI to Oakland. Additional coverage is provided by two SFFD stations on mainland San Francisco which cover the lower (eastbound) deck west and inside the YBI Tunnel.

Schools

There is a school on TI which is part of the San Francisco Unified School District. It includes grades kindergarten through 8. In Oakland, there are several private and public

schools in Census Tract 4017, but the closest school is approximately 3 kilometers (2 miles) from the Oakland Touchdown. In addition, there is a child development center at the Oakland Army Base which may remain in operation at its current location after the base closes in 2001.

Cultural and Recreational Facilities

There are a variety of recreation facilities on TI, including a 103-slip marina in the lagoon between TI and YBI, a fishing pier, parks, ball fields, tennis courts, and a golf driving range. There are a number of indoor recreation resources formerly operated by the Navy. The only recreation area on YBI is a tennis court on the USCG property.

Radio Point Beach is located north of the bridge approach and west of the SFOBB Toll Plaza, at the end of Radio Road. BCDC requirements for the Cypress Replacement Project/I-80 Flyover Project (Permit 11-93) include an extension of the Bay Trail via a road south of the eastbound bridge roadway. A lookout area on the south side of the SFOBB takeoff point is to be developed and connected by bicycle and walking path to a lookout area at the north side of the SFOBB to the west of Radio Point Beach.

3.1.7 Environmental Justice

Environmental justice concerns reflect the potential of a project to adversely affect a low-income or minority community to a greater extent than other segments of the population. Federal policies, including Executive Order No. 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations) and FHWA guidance documents, require that relevant neighborhoods be determined as "minority" or "low-income" based on U.S. Census demographic data.

The U.S. Department of Transportation and FHWA have issued guidance on complying with Executive Order 12898 during the environmental review process. The U.S. Department of Transportation's Final Strategy for implementing the executive order was published in the Federal Register on June 29, 1995. The objectives can be summarized as: 1) improve the environment and public health and safety in the transportation of peoples and goods and the development and maintenance of transportation systems and services; 2) harmonize transportation policies and investments with environmental concerns, reflecting an appropriate consideration of economic and social interests; 3) consider the interests, issues, and contributions of affected communities, disclose appropriate information, and give communities an opportunity to be involved in decision-making.

In addition to complying with the executive order, the Department of Transportation is committed to Title VI of the Civil Rights Act, which provides that no person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity of receiving Federal financial assistance.[11] (See Appendix L.)

[11] Federal Highway Administration/Federal Transit Administration, Interim Region 9 Guidance: *Addressing Environmental Justice in the Environmental Impact Statement*, May 1997.

A neighborhood is considered minority or low-income if it contains any readily identifiable groups of minority persons and/or low-income persons who live in geographic proximity to the project. According to U.S. Census data, the overall population in San Francisco in 1990 was 53 percent minority. Therefore, the TI/YBI neighborhood would not be defined as minority because its population is approximately 40 percent minority. According to the 1990 Census, the minority population is about 68 percent for the City of Oakland. The West Oakland neighborhood that contains the touchdown for the project, Census Tract 4017, includes a minority population of 84 percent, identifiably higher than the city as a whole. The neighborhood, therefore, is considered minority. Although the residential population of Census Tract 4017 is not located adjacent to the project, the minority designator of Census Tract 4017 was considered in the evaluation and reporting of potential environmental impacts of the project. Neither the San Francisco nor Oakland census tract in closest proximity to the project meets the Department of Transportation low-income definition, which uses the Department of Health and Human Services' poverty guidelines of a median household income of less than $15,150 for a family of four.

3.2 TRANSPORTATION SETTING

This section describes existing and planned transportation facilities in the project vicinity, including the local street and highway system, passenger rail and public transit facilities, pedestrian and bicycle facilities, maritime facilities, and parking facilities. Existing and projected future travel demand are also discussed.

3.2.1 Traffic

Existing Street and Highway System

The traffic study area includes I-80 between Yerba Buena Island (YBI) and the toll plaza, the freeway ramps on YBI, and local streets on YBI and in the Oakland Touchdown area.

The existing San Francisco-Oakland Bay Bridge (SFOBB) is a double-deck structure. Eastbound traffic travels on the lower deck and westbound traffic travels on the upper deck. The bridge currently accommodates cars, buses, trucks, and motorcycles. There are five 3.3-meter (11-foot) travel lanes on each deck and no shoulders. The posted speed limit is 80 kmh (50 mph) for both directions.

YBI is directly linked to the SFOBB by a set of freeway ramps that allow access to and from east- and westbound bridge lanes. There are six ramps, including two westbound on-ramps, one westbound off-ramp, one eastbound on-ramp and two eastbound off-ramps. The YBI ramps are shown in Figure 3-4 in Appendix A.

On YBI, there are two main roadways, Macalla Road and Treasure Island Road. Macalla Road connects to Treasure Island Road via an undercrossing beneath the SFOBB. Macalla Road also provides access to the northern part of YBI, including most of the housing and the United States Coast Guard (USCG) station. Treasure Island Road traverses the west side of YBI and provides access to Treasure Island (TI). Figure 3-5 in Appendix A shows the YBI street system.

The I-80 freeway, SFOBB Toll Plaza, and existing bridge touchdown dominate the existing Oakland Touchdown area. Vehicle access to the area is primarily from the distribution structure. Westbound high-occupancy vehicle (HOV) lanes extend to the north and south sides of the toll plaza from I-80, I-580, and I-880. They terminate on the west side of the toll plaza where HOV traffic merges with mixed-flow traffic.

Local roadways providing access to the Oakland Touchdown area include Burma Road, an extension of West Grand Avenue, and Maritime Street. These streets are located outside of the project area; however, they provide access to the Oakland Touchdown area and could potentially be affected by the project. These roadways are generally low volume, but this low volume consists of a high percentage of trucks serving the Port of Oakland and local industry. There are other roads in the area which provide access for Caltrans vehicles to the toll plaza, Caltrans maintenance facility, and auto access to Radio Point Beach and the area to the south of the bridge abutment. Figure 3-6 in Appendix A shows the Oakland Touchdown area roadways, and Figure 3-

7 in Appendix A shows the streets outside of the project area that provide access to the touchdown area.

Future Roadway Improvements

The Draft TI Reuse Plan includes a Draft Circulation Element for TI and YBI. Due to the limited capacity of the on- and off-ramps connecting YBI with the SFOBB, automobile access to the islands is de-emphasized in the Circulation Element. Instead, the focus is on ferry access to the islands and alternative modes of transportation for circulation on the islands such as foot, bicycle, and shuttle buses. A bus shuttle system would provide service from the TI ferry terminal to TI and YBI, along Macalla and Treasure Island Roads.

The Circulation Element also calls for minor changes in circulation on YBI. The element proposes limited improvements to improve emergency access. Due to the steep terrain and the threat of landslides, most of the streets on YBI, including Macalla Road, would remain in their current configuration. The SFOBB on- and off-ramps would remain in their present configuration. Treasure Island Road would remain the primary access route between the SFOBB and TI.

Existing and Projected Traffic Demand

The SFOBB is the primary motor vehicle link between San Francisco and the San Francisco Peninsula and the East Bay. The westbound approaches are congested during the morning commute period, and the eastbound approaches are congested during the evening peak period. During these times the SFOBB operates at capacity. The SFOBB is also heavily traveled during off-peak travel times. Traffic flow on the SFOBB is vulnerable to congestion due to stalls, accidents, lane closures required for bridge maintenance, and the lack of shoulders for clearing stopped vehicles. There are 274,000 vehicles that use the SFOBB daily. In the morning peak hour, 10,800 westbound vehicles use the SFOBB.

The freeway ramps to and from the SFOBB at YBI typically operate with no more than 200 vehicles during the peak hour. Despite low traffic volumes, the eastbound on-ramp operates at capacity in the afternoon peak hour due to severely restricted design limitations (e.g., tight curves and short merges onto the freeway).

All of the local streets in the project area (YBI, TI, and the Oakland Touchdown area) currently operate with low volumes of traffic. The streets in the Oakland Touchdown area serve primarily truck traffic.

In the future, peak-hour traffic demands on the approaches to the SFOBB are expected to increase. These increases will be due to increased demand for travel between the East and West Bay Area. Traffic volumes for westbound PM peak and eastbound AM peak may increase since there is unused capacity during those peak periods. Also, Average Daily Traffic (ADT) may increase due to unused capacity available during off-peak travel times. However, traffic volumes on the bridge itself are expected to remain fairly constant during the westbound AM peak period and the eastbound PM peak period because the bridge itself constrains traffic volumes.

3.2.2 Transit

AC Transit, the provider of transbay bus service, currently operates 37 transbay bus routes between East Bay cities and the Transbay Transit Terminal in San Francisco. Service is provided during daytime and evening hours with most service provided during morning and afternoon commute periods. Transbay buses access the SFOBB via West Grand, Maritime Street, I-580, I-80, and I-880. The buses use the HOV lanes at the toll plaza. West Grand Avenue is a major access route for nine AC Transit Transbay routes. Two bus routes (one transbay; one local) also operate on Maritime Street. There are no public transit routes operating on surface streets in the Oakland Touchdown area. In 1998, AC Transit carried about 13,000 passengers across the bridge per day and between 2,100 and 3,200 in the peak hour.

The San Francisco Municipal Railway (MUNI) provides local bus service (Route 108) between TI and the Transbay Transit Terminal in San Francisco via the SFOBB. Route 108 operates at hourly headways on weekdays and serves a single bus stop at the TI gate. There are no stops on YBI.

Bay Area Rapid Transit (BART) provides about 530 daily transbay trains in the corridor. BART carries about 134,000 transbay passengers per day and between 14-15,000 per hour in the peak hours.

Caltrans operates a bicycle shuttle between the MacArthur BART station in Oakland and the Transbay Transit Terminal in San Francisco via the SFOBB. The shuttle carries about 1,500 to 2,000 cyclists per month.

3.2.3 Non-Motorized Traffic: Pedestrians and Bicycles

Existing Facilities

No bicycle or pedestrian facilities currently exist within the project limits, and pedestrians and bicycles are prohibited from using the SFOBB.

Currently, pedestrians and bicyclists have several transit options for travel in the SFOBB corridor.

- BART operates 530 daily transbay trains. The system carries about 260,000 passengers per day. Bicycle ridership on the entire BART system is about 3,500 passengers per day. Bicyclists are prohibited from using the system during commute hours in the peak direction of travel.

- AC Transit operates 37 transbay bus routes that provide 654 daily buses between the East Bay and the Transbay Transit Terminal via the SFOBB. AC Transit intends to outfit all 700 buses serving transbay routes with bicycle racks.

- The Alameda-Oakland-San Francisco Ferry has 13 daily round trips from Jack London Square in Oakland to the San Francisco Ferry Building. The ferry also operates six daily round trips to Pier 39 in San Francisco. The ferries currently carry

about 10 to 15 bicyclists per day during the week and higher numbers on the weekends.

- Caltrans Bicycle Shuttle transports bicyclists between the MacArthur BART station and the Transbay Transit Terminal in San Francisco. The shuttle makes four daily departures from Oakland and three departures from San Francisco in the morning and four San Francisco and three Oakland departures in the evening. The shuttle carries about 1,500 to 2,000 bicyclists per month.

Planned Pedestrian and Bicycle Facilities

Several bikeway and pedestrian facilities have been planned in the East Bay portion of the study area:

- A bikeway is proposed on Maritime Street as mitigation for improvements made by the Port of Oakland. No completion date has been identified by the City of Oakland.

- A bikeway is proposed on Seventh Street to provide access to Portview Park.

- A bikeway on West Grand Avenue between Maritime Street and Mandela Parkway is planned as part of the I-880/Cypress Replacement and the I-80 HOV lanes and Operational Improvement Project.

- A bikeway to be located adjacent to eastbound I-80 is proposed as a Bay Conservation and Development Commission (BCDC) permit requirement of the I-880/Cypress Freeway Replacement Project. In concept, it would follow the Caltrans maintenance road and provide access to proposed scenic overlooks at the Oakland Touchdown area as well as connect to the Bay Trail system.

- The Bay Trail is a regional hiking and bicycling trail planned to ring the shoreline of San Francisco and San Pablo Bays. The SFOBB and the region's other toll bridges are all designated as "spine" trails of the Bay Trail.[12] The spine trails create the backbone of the Bay Trail system, encircling and crossing the Bay and providing a continuous recreational corridor in all nine Bay Area counties. The Bay Trail system is only partially complete.

Figure 3-7 in Appendix A shows these planned improvements.

3.2.4 Maritime Traffic

Ferries

Two companies provide ferry service between the East Bay and San Francisco. The Blue and Gold Fleet provides weekday and weekend service between the Ferry Building and Pier 39 in San Francisco, Oakland's Jack London Square, and Alameda's Main Street Terminal. None of the terminals is located within the project area. The

[12] Association of Bay Area Governments. *Bay Trail Plan*, Figure III-3. July 1989.

ferries pass below the SFOBB West Span on their route and do not travel through the SFOBB East Span Project area.

Harbor Bay Maritime also provides ferry service between San Francisco and the East Bay. The only East Bay stop is made at Harbor Island in Alameda outside the project limits. These ferries pass below the SFOBB West Span on their route across the Bay and do not travel through the East Span Project area.

Maritime Operations

The SFOBB traverses the southern portion of Central San Francisco Bay, an area bounded to the north by the Richmond-San Rafael Bridge, the west by the Golden Gate Bridge, and the south by the SFOBB. The western portion of the Central Bay is characterized by relatively deep water, high tidal water exchange through the Golden Gate, and strong currents. This area is dominated by rocky shorelines. The eastern portion of the Central Bay is dominated by shallow mudflats.

The San Francisco Bay is used by commercial and recreational maritime traffic. The channel between SFOBB Piers E-2 and E-3 is used by most commercial navigation (the navigation channel is shown on Figure 2-2 in Appendix A). It is approximately 427 meters (1,400 feet) wide with 56 meters (184 feet) of vertical clearance above mean high water. There is no federal navigation channel on the east side of TI. The controlling depth in this area is 7.6 meters (25 feet). The largest commercial vessels using this waterway are tug and fuel barge combinations, derricks, dredges, tour boats, and occasionally small freighters. Larger commercial vessels transit beneath the SFOBB west of YBI. The USCG has established a regulated navigation area for the portion of San Francisco Bay east of TI, precluding vessels of more than 1,450 gross tonnes (1,600 gross tons) or tugs with a tow of 1,450 gross tonnes (1,600 gross tons) or more from meeting, crossing, or overtaking a vessel of similar size.

Two maritime facilities are located within the project area. They are the Port of Oakland's Bay Bridge Terminal area and the USCG moorings on YBI.

3.2.5 Truck Routes and Truck Traffic

Trucks are a major component on certain study area roadways. I-80 is a major local, regional, and interstate truck route, carrying approximately 11,500 truck trips daily on the SFOBB, or about four percent of the average annual daily traffic (AADT) volume.[13] Local streets, including Maritime Street, Burma Road, and the maintenance roads in the Oakland Touchdown area serve primarily truck traffic associated with the Port of Oakland.

3.2.6 Parking

One paved area used for parking is located within the project area on YBI. It is located east of Quarters 1 and can accommodate approximately 315 parking spaces. This

[13] Caltrans, *1996 Annual Average Daily Truck Traffic on the California State Highway System*, October 1997.

area is currently used for special events at the Naval Quarters. Most residents, visitors, and employees prefer to park closer to their destinations. On-street parking within the project area is difficult because the roadways are narrow; however, two on-street spaces are located just south of the SFOBB on Treasure Island Road. Additional on-street parking is located in the residential neighborhoods and at former Navy facilities.

In the Oakland Touchdown area, parking for toll plaza and other workers currently exists in the median area between the westbound and eastbound I-80 alignments. Other land uses in the touchdown area have "informal" parking areas because the land is open and flat.

3.2.7 Federal Aviation Administration

The existing and proposed SFOBB retrofit/replacement structures are required to conform to Federal Aviation Administration (FAA) Regulations Part 77, "Objects Affecting Navigable Airspace." The conformance requires both obstruction marking and lighting in accordance with FAA Advisory Circular AC70/7460 effective January 1, 1996.

3.3 VISUAL SETTING

The focus of this visual assessment has been the visual effects of the Retrofit Existing Structure Alternative and the replacement alternative bridge design variations (skyway and signature) and replacement alternative alignments (Alternatives N-2, N-6, and S-4) in terms of visual obstruction, dominance within the viewshed, and design quality in terms of vividness, intactness, and unity. These issues are also considered with respect to the types of viewers that will be affected by the project (residents, office workers, motorists, pedestrians, bicyclists, and recreational users). As described below, the visual effects of each design variation and alignment are evaluated from 17 viewpoints around the Bay Area, as are the changes that would occur within each of the distinct landscape units which make up the study area. For more information on this visual assessment, the Visual Assessment Technical Report is available at the locations listed in the Preface of this document. The Visual Assessment Technical Report includes a CD-ROM with photographs and an interactive map of visual simulations.

There are several issues which are not evaluated in this study. These include detailed design issues such as color, lighting, railing, walkways, and piers. These design elements of replacement alternatives have not yet been developed in detail.

In addition, the merits of various signature bridge design concepts are not discussed in this report. A separate process was established to evaluate the merits of various signature bridge design concepts. This process began with meetings of the Bay Bridge Design Task Force (Task Force), which considered several design variations for the replacement alternatives. The Task Force was established by the Metropolitan Transportation Commission (MTC). The Task Force initiated an open request for ideas about the design of the signature portion of the East Span and held numerous public meetings. The Task Force also received an evaluation of various designs by a distinguished panel of engineering and architectural experts (the Engineering and Design Advisory Panel, or EDAP) and elected officials.

3.3.1 Existing Visual Character and Context

Regional Landscape and Scenic Resources

The Bay Area is one of the most scenic areas of the world, combining water, islands, urban skylines, bridges, and mountains into vistas both picturesque and impressive. Seven different bridges span the Bay, each one constituting a significant scenic resource in its own right. The Golden Gate Bridge is known around the world for its grace and beauty. However, all seven bridges, including the San Francisco-Oakland Bay Bridge (SFOBB), the Richmond-San Rafael, the San Mateo, and the Dumbarton, span significant stretches of open water and are highly visible from vantage points around the Bay. The San Francisco Bay Area extends over 97 kilometers (60 miles) from the Sacramento River Delta in Benicia to the marshlands of Santa Clara County, a total of more than 1,000 square kilometers (386 square miles). The Bay is a rich marine resource providing navigable waterways for commerce and habitat for countless species.

The cities of Oakland and San Francisco are located across the Bay from one another, roughly midway between the northern and southern ends of the Bay. For viewers both on and off the water, the area between these two cities is particularly scenic. Four major islands (Alcatraz, Angel, Treasure, and Yerba Buena) are found in this region; Mt. Tamalpais and the hills of Marin County tower to the west, and the skylines of Oakland and San Francisco complement the area's natural beauty. The preservation of the aesthetic quality of this region is of particular importance to decision-makers and the millions of people who live in and visit the Bay Area each year.

Context of the East Span within the Bay Area

Along with the Golden Gate Bridge, the SFOBB is one of the Bay Area's most prominent man-made features. See Figure 3-8 in Appendix A.

The SFOBB East Span is a highly visible structure that can be seen from cities on the west side of the Bay (San Francisco, Sausalito) as well as from cities in the East Bay (including Alameda, Oakland, Berkeley, Emeryville, Albany, El Cerrito, and Richmond). For eastbound motorists, the SFOBB East Span is the gateway into Oakland and the East Bay. While motorists traveling in this direction on the existing East Span have views of the City and Port of Oakland to the south and the hills behind the communities of Berkeley and Emeryville to the north, these views are highly obstructed by the upper deck of the bridge and the steel trusses which line the bridge.

3.3.2 Existing Landscape Units And Visual Image Types

The study area has been subdivided into "landscape units" to facilitate its description and analysis of the project. Landscape units are geographically distinct portions of the study area which have a particular visual character. In the study area, the five landscape units identified are Yerba Buena Island, the main span (cantilever section) of the existing East Span, the Incline Section of the East Span, the Oakland Touchdown area, and the toll plaza. The boundaries of each landscape unit are shown in Figure 3-9 in Appendix A and described in Table 3.3-1. Figures 3-10a-c in Appendix A include representative photographs of the landscape units.

Each landscape unit has a certain visual character based upon the land uses that comprise it. These smaller scale land uses and landforms within each landscape unit are called "visual image types". Visual image types are areas that exhibit a fairly homogeneous visual quality. The visual image types are depicted in Figures 3-10a-c in Appendix A.

Table 3.3-1 Landscape Units

Landscape Unit	Description
Yerba Buena Island (YBI)	• 61 ha (150 acres) in size, 100 m (328 ft) maximum elevation • Visually, the island appears to be largely undeveloped: steep, wooded hillsides leading down to the shoreline. • Structures visible from the SFOBB East Span: USCG facilities, the observation tower, tunnel portal. • Visual image types present on the island include residential, industrial, military, historic, and open space.
The Main Span (Cantilever Section)	• 1.6 km (1 mile) long, up to 61 m (200 ft) above the Bay. • Composed of steel beams, grayish-silver in color which form a zigzag pattern along either side of the roadway between the upper and lower decks. • Signature portion of the eastern span. Signature feature is fashioned in a style reminiscent of a train trestle. Includes a 737 meter (2,418 foot) cantilever truss adjacent to YBI, five high truss spans of slightly more than 152 meters (500 feet) each. • Visual image types present include open space (Bay) and historic (the bridge).
The Incline Section	• 1.7 km long (1.1 miles), rising from sea level to meet the cantilever section at 61 m (200 ft) above the Bay. • Connects the cantilever section of the SFOBB East Span to the Oakland Touchdown area. • Composed of steel beams, grayish-silver in color which form a zigzag pattern along either side of the roadway between the upper and lower decks. • Visual image types present include open space (Bay) and historic (the bridge).
Oakland Touchdown	• 1.6 km (one mile) from the toll plaza to where the East Span begins its incline. • Area is flat and rises only a few meters above sea level. • On the north side of the touchdown is an open area adjacent to the mudflats of the Emeryville Crescent. This area harbors a few trees and low marshland vegetation. • On the south side of the span industrial uses, including open storage, the EBMUD dechlorination facility, and two maintenance buildings, one once part of the historic Key System, are located at the extreme western end of the touchdown. An undeveloped area owned by the U.S. Army exists along the shoreline at the southern edge of the Touchdown area. • Visual image types include industrial, historic, and open space.
SFOBB Toll Plaza	• Ground level, encompassing 15 lanes of westbound traffic. • Entirely man-altered with broad expanses of asphalt where vehicles queue to pay tolls, and six lanes of eastbound traffic continuing off the bridge toward the network of highways in the East Bay. • Main Bridge Administration Building is located at the toll plaza, along with a series of Caltrans maintenance and repair buildings which support the operation and maintenance of the SFOBB. • Visual image types in this landscape unit consist of military and industrial.

Source: Visual Impact Assessment, September 1998.

3.3.3 Viewer Groups and Viewpoints

Viewer groups include those viewers who can expect to see views *from* the bridge, and those who can expect to see views *to* the bridge. Viewer groups are defined as those viewers most likely to share similar exposure to and expectations of their view from and to the SFOBB East Span.

Views from the Bridge

Views from the bridge are seen from motor vehicles. Viewer groups include commuters, recreational users, and commercial users.

Commuters. The flow of commuting traffic is primarily westbound (to San Francisco) during the morning period and primarily eastbound (to Oakland and surrounding communities) in the afternoon period.

Westbound traffic on the SFOBB rides on the upper deck of the bridge. Westbound views are partially obstructed by the architecture of the bridge itself, most noticeably by the presence of a 1.2-meter (4-foot) high solid railing that runs along either side of the roadway. The construction style includes steel beams that reach from the upper deck into the cantilever structure at regular intervals, partially obstructing views from automobiles. Nevertheless, commuters have several dramatic views, including the skyline of San Francisco and the Marin Headlands, as they proceed westward.

Eastbound traffic on the SFOBB rides on the lower deck of the span. Views from the lower deck are significantly obstructed for three reasons: the presence of the westbound roadway above, the presence of a 1.2-meter (4-foot) high solid railing that lines either side of the lower span, and the presence of steel beams that span from the upper to lower deck at regular intervals. For motorists commuting in sport utility vehicles, buses, and other vehicles with a higher passenger compartment, visibility is less compromised by the solid railing and the architecture of the bridge.

Recreational Users. Recreational users of the bridge include tourists enjoying the scenery of the Bay, outdoor enthusiasts traveling to points eastward from San Francisco, and people making their way to events or gatherings outside of their working environment. All recreational users are in vehicles as there are no bicycle or pedestrian facilities on the SFOBB.

Commercial Users. Commercial users include truck drivers, delivery personnel, bus drivers, and other people involved in day-to-day commerce in the Bay Area. Commercial users might make several trips across the bridge on a daily basis. Commercial users would tend to ride in vehicles with a higher passenger compartment and so would enjoy greater visibility from the bridge.

Views to the Bridge

The viewers' experience of the bridge varies considerably based upon their location, the duration of their view, and the frequency with which they are exposed to views of the bridge. To provide a representative sample of what changes viewers across the San Francisco Bay Area would experience in their viewshed as a result of construction

of a new bridge, a cross section of viewers and viewpoints was chosen. Please see Figures 4-5 through 4-12 in Appendix A for photographs of views toward the East Span.

Viewer Groups. Viewer groups identified in this section include commuters, ferry passengers, residents and workers, and recreational users/tourists.

Commuters with views to the East Span exist on both sides of the Bay. Commuters traveling on the interstate highway system in the East Bay on sections of I-80 westbound and I-880 northbound have particularly clear views and would be most sensitive to changes to the East Span.

Ferry passengers primarily include commuters between various points in the East and North Bay and San Francisco. Ferry passengers view the East Span from the Bay surface.

Residential viewers and workers exist on both sides of the Bay. Views vary greatly within this group, based on proximity, view obstruction, and the location and elevation of the residence/workplace. Residents and workers with clear, unobstructed views would be most sensitive to changes to the East Span. In the East Bay, potential viewers may live/work in Oakland, Emeryville, Berkeley, Albany, El Cerrito, or Richmond. In the West Bay, potential viewers may live/work in San Francisco or Sausalito.

Recreational users and tourists have abundant opportunities to view the East Span from all around the Bay Area. Activities such as boating, kayaking, windsurfing, and fishing make use of the Bay itself, while activities such as sightseeing, hiking, and walking often incorporate a view of the Bay. These users would typically be very sensitive to changes to the East Span.

Existing Visual Quality. Representative viewpoints were identified and were used to simulate the proposed project alternatives. This was done to assist in the analysis and documentation of visual resource changes. The location of these viewpoints within the Bay Area is depicted in Figure 3-11 in Appendix A. Potential viewpoints were chosen on the basis of a variety of factors, including: high visibility/close proximity to sensitive viewers; specific views or types of views identified as important by the public, representative of specific viewers or viewer groups, and range of view types available to the public (close proximity to long-distance views).

The existing visual quality for each of the viewpoints identified was evaluated using an approach to scenic quality evaluation that looks for indicators of the level of visual relationships rather than on a judgment of physical landscape components. This approach provides a set of three evaluative criteria developed under the sponsorship of the Federal Highway Administration in previous visual impact studies: vividness, intactness, and unity.

These criteria are defined as follows:

- **Vividness** is the visual power or memorability of landscape components as they combine in striking and distinctive visual patterns. An example within the study area is the view of the Bay and San Francisco skyline seen from the upper deck of the existing Bay Bridge.

- **Intactness** is the visual integrity of the natural and man-built landscape of the immediate environs and its freedom from encroaching elements. An example of lack of intactness within the study area is the patchwork of industrial uses on the Oakland Touchdown.

- **Unity** is the visual coherence and compositional harmony of the viewshed. The viewshed includes all natural and man-made features found within the normal view range. In man-altered landscapes, it frequently attests to the careful design or fit of individual components in the landscape. An example is the way man-made elements such as the Golden Gate Bridge combine with natural features such as San Francisco Bay to provide a coherent image unique to the Bay Area.

The results of this analysis of existing visual quality are summarized in Table 3.3-2.

Table 3.3-2 Summary of Existing Visual Quality

Viewpoint	Setting	Vividness	Intactness	Unity
Richmond Marina	9.6 km (6 mi.) north of span. Coastal. Sea level.	Moderate-to-high	Moderate-to-high	Moderate-to-high
Berkeley Pier	4.8 km (3 mi.) northeast of span. Coastal. Sea level.	High	High	Moderate
The Claremont Hotel	8.0 (5 mi.) kilometers northeast of span. Inland. Elevated.	Low	Low-to-moderate	High
I-80 between University Ave. and Ashby Ave.	4.0 km (2.5 mi.) northeast of span (moving southbound). Inland. Sea level.	Moderate	Low-to-moderate	Low-to-moderate
Emeryville Marina	2.5 km (1.6 mi.) northeast of span. Coastal. Sea level.	Moderate	Moderate	Moderate-to-high
Oakland Touchdown Area	60 m (200 ft.) south of span. Coastal. Sea level.	High	High	High
I-880 Approaching the SFOBB	9.8 km (6 mi.) east of span at closest point (moving). Inland. Elevated.	Moderate	Low-to-moderate	Low-to-moderate
Oakland Federal Building	5.6 km (3.5 mi.) southeast of the span. Inland. Elevated.	Low-to-moderate	Moderate	Moderate-to-high
Alameda Naval Air Station	4.0 km (2.5 mi.) south of span. Inland. Sea level.	Moderate-to-high	Moderate	Moderate
Oakland-San Francisco Ferry	As close as 0.8 km (0.5 mi.) south of span (moving west-east). In the Bay. Sea level.	High	High	High
Hunters Point	10.0 km (6.3 mi.) southwest of span. Coastal. Sea level.	Moderate	Moderate-to-high	High
Potrero Hill	7.0 km (4.4 mi.) southwest of span. Inland. Elevated.	Moderate	Moderate	Moderate-to-high
Pier 39	5.0 km (3 mi.) west of span. Coastal. Sea level.	Low-to-moderate	Moderate-to-high	Moderate
Treasure Island	0.8 km (0.5 mi.) northwest of span. Coastal. Sea level.	High	High	Moderate-to-high
Sausalito	12.0 km (7.5 mi.) northwest of the span. Coastal. Sea level.	Moderate	Moderate-to-high	High
Angel Island	7.2 km (4.5 mi.) northwest of span. Inland. Elevated.	Moderate-to-high	Moderate	High
Vallejo-San Francisco Ferry	As close as 2.5 km (1.6 mi.) northwest of span (moving south-north). In the Bay. Sea level.	High	Moderate-to-high	High

Source: Visual Impact Assessment, September 1998.

3.4 AIR QUALITY

The effects of air pollution on health and other aspects of the quality of life are considered potentially serious by regulatory agencies such as the U.S. Environmental Protection Agency (EPA). Several federal, state, and local regulations and programs have been established to protect and improve air quality in the Bay Area.

3.4.1 Regulatory Context

Federal Regulations

Pursuant to the federal Clean Air Act of 1970 and its subsequent amendments, the EPA established ambient air pollutant concentration standards and maximum allowable emission rates for certain individual sources of air pollutants. EPA made each state responsible for attaining ambient air quality standards—National Ambient Air Quality Standards (NAAQS)—within its borders. A State Implementation Plan (SIP) must be prepared that demonstrates how each state will attain the NAAQS.

NAAQS have been established for seven criteria air pollutants: ozone, carbon monoxide, particulate matter with an aerodynamic diameter less than ten micrometers (PM_{10}), particulate matter with an aerodynamic diameter less than 2.5 micrometers ($PM_{2.5}$), nitrogen oxides, lead, and sulfur dioxide. Primary standards for air pollutants were established to protect public health, while secondary standards were established to protect the public welfare by preventing impairment of visibility and damage to vegetation and property. The federal primary standards are listed in Table 3.4-1. The table also summarizes the attainment status for each criteria pollutant regulated by the EPA.

On the federal level, the Bay Area has been designated as an attainment (meeting standards) or unclassified (i.e., available data do not support a designation of non-attainment or attainment) area for all pollutants, except ozone. In June 1998, the EPA re-designated the Bay Area as non-attainment area for ozone because the area had 11 violations in 1995 and six violations in 1996. The Bay Area Air Quality Management District (BAAQMD), the local agency in charge of controlling air pollution and attaining air quality standards in the Bay Area, must now develop a plan to meet the national ozone standard by the year 2000.

Under the Clean Air Act, regions that are maintenance areas (i.e., a geographic area that had previously been designated a non-attainment area but now meets the applicable standard) still must demonstrate how they will maintain compliance with the standard. The BAAQMD has prepared a Carbon Monoxide Maintenance Plan that includes information on control measures that will be used to keep the area in attainment for at least the next ten years.

In addition to other SIP and Air Quality Plan activities, federal agencies must also make a determination of conformity with the SIP before taking any action on a proposed project located in a non-attainment or maintenance area. In 1993, EPA published the

Table 3.4-1 State and Federal Air Quality Standards

		California Standards		National Standards	
Pollutant	**Averaging Time**	**Concentration**	**Bay Area Attainment Status[1]**	**Concentration**	**Bay Area Attainment Status**
Ozone	1-hour	0.09 ppm (180 ug/m^3)	N	0.12 ppm (235 ug/m^3)	N[2]
	8-hour	---	---	0.08 ppm (157 ug/m^3)	U
Carbon Monoxide	8-hour	9.0 ppm (10 mg/m^3)	A	9 ppm (10 mg/m^3	A
	1-hour	20 ppm (23 mg/m^3)	A	35 ppm (40 mg/m^3)	A
Nitrogen Dioxide	Annual Average	---	---	0.053 ppm (100 ug/m^3)	A
	1-hour	0.25 ppm (470 ug/m^3)	A	---	---
Sulfur Dioxide	Annual Average	---	---	80 ug/m^3 (0.03 ppm)	A
	24-hour	0.04 ppm (105 ug/m^3)	A	365 ug/m^3 (0.14 ppm)	A
	1-hour	0.25 ppm (655 ug/m^3)	A	---	---
Suspended Particulate Matter (PM_{10})	Annual Arithmetic Mean	---	---	50 ug/m^3	A
	Annual Geometric Mean	30 ug/m^3	N	---	---
	24-hour	50 ug/m^3	N	150 ug/m^3	U
Suspended Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	---	---	15 ug/m^3	U
	24-hour	---	---	65 ug/m^3	U
Lead	Calendar Quarter	---	---	1.5 ug/m^3	A
	30-Day Average	1.5 ug/m^3	A	---	---

Source: California Air Resources Board, Proposed Amendments to the Area Designations for State Ambient Air Quality Standards, and Proposed Maps of the Area Designations for the State and National Ambient Air Quality Standards, November 1997

Notes:

1. A = Attainment. N = Non-attainment. U = Unclassified.
2. The Bay Area was re-designated as non-attainment for ozone in June 1998.

General Conformity Rule that indicates how federal agencies are to make such a determination. A similar rule was created to specifically address conformity issues related to transportation activities. The most recent version of the Transportation Conformity Rule is July 1997. In general, transportation projects must not cause or contribute to new violations of air quality standards, worsen existing violations, or interfere with timely attainment of standards. Regional transportation plans (RTPs) and transportation improvement programs (TIPs) must conform to the SIP. Individual projects with federal funding or approval from the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA) must come from a conforming RTP and TIP, have been included in the regional emissions analysis for the RTP and TIP or be included in a newly performed regional analysis.

Projects must also be analyzed for their localized air quality impacts in PM_{10} and carbon monoxide non-attainment or maintenance areas. Guidance for performing PM_{10} analyses is not yet available.

State Regulations

The California Air Resources Board (CARB) coordinates and oversees the activities of California's many local air quality agencies. The CARB is also responsible for incorporating local non-attainment plans into the SIP. The CARB has established state ambient air quality standards, many of which are more stringent than the corresponding NAAQS (see Table 3.4-1 for a comparison of the standards). The CARB and the local air quality agencies operate numerous air quality monitoring stations throughout the state. Data collected at these stations are used to classify areas and air basins as attainment or non-attainment for each criteria air pollutant based on whether the federal and state standards have been achieved.

The California Clean Air Act (CCAA), which became effective on January 1, 1989, provides a planning framework for attainment of California Air Quality Standards. Local air quality agencies in violation of state ambient air quality standards are required to prepare plans for attaining the state standards.

The San Francisco Bay Area has been classified by the CARB as a serious state non-attainment area for ozone. The Bay Area 1994 Clean Air Plan included a comprehensive strategy to reduce ground-level ozone in the Bay Area. This plan was updated in 1997. The Bay Area 1997 Clean Air Plan includes changes in the organization and scheduling of some of the 1994 Clean Air Plan control measures and also includes 12 new stationary and mobile source control measures, as well as two new transportation control measures.

The Bay Area also does not attain state PM_{10} ambient air quality standards, but attainment programs for PM_{10} are not yet required. The California Legislature, when it passed the California Clean Air Act in 1988, recognized that PM_{10} attainment could not be easily obtained. The CCAA did require the CARB to produce a report regarding the prospect of achieving the state ambient air quality standard for PM_{10}. The CARB recommended that certain actions be taken, but did not impose a planning process to require attainment by a certain date.

3.4.2 Meteorology and Topography

The primary factors affecting local air quality are the locations of air pollutant sources and the amounts of pollutants emitted, but meteorological and topographical conditions also are important. Atmospheric conditions such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants. Another important factor is the Pacific Ocean, which moderates temperatures and helps create consistent wind gradients.

The San Francisco Bay Area has complex terrain, relatively strong prevailing winds because of its closeness to the Pacific Ocean, and strong temperature gradients between the coast and inland areas. Consequently, the Bay Area has low potential for accumulation of pollutants near the coast and high potential in sheltered inland valleys. The project is in an area where pollution potential is very low due largely to good ventilation and less influx of pollutants from upwind sources. However, on occasion, the area does experience warm temperatures, calm winds, and pollutant stagnation.

3.4.3 Existing Project Area Air Quality

Monitoring data in the project area are limited. The criteria pollutant monitoring stations closest to the project site are located on Alice Street (near Jack London Square) in Oakland and at the county hospital in San Leandro. Monitored values at these stations may be slightly higher than actual concentrations in the project area since there are so few pollutant sources near the SFOBB. The Alice Street Station measures ozone and carbon monoxide and the San Leandro Station measures for ozone and PM_{10}. Table 3.4-2 summarizes recent monitoring data from these two stations[14].

The monitoring data show that the area occasionally violates state ozone and 24-hour PM_{10} standards and, even more rarely, exceeds the federal ozone standard. The Oakland station monitored only one state ozone violation during the three years examined. During the same three years, the San Leandro station had 11 violations of the state ozone standard and three violations of the federal standard. The California 24-hour PM_{10} standard was exceeded twice. All other pollutant levels were below federal and state standards.

[14] California Air Resources Board, Summary of Air Quality Data for 1995, 1996, and 1997, 1996, 1997, and 1998.

Table 3.4-2 Air Pollutant Data Summary (1995-1997)

		Year		
		1995	**1996**	**1997**
Pollutant	**Averaging Time**	Concentration (ppm)	Concentration (ppm)	Concentration (ppm)
Ozone	1-hour (O)[1]	0.11[3]	0.09	0.08
	(SL)[1]	0.15	0.11	0.11
Carbon Monoxide	8-hour (O)	3.9	3.9	3.6
	1-hour (O)	5.0	7.0	8.0
Suspended Particulate Matter (PM_{10})[2]	Annual Arithmetic Mean (SL)	19.5	21.3	17.4
	Annual Geometric Mean (SL)	16.9	19.1	15.9
	24-hour (SL)	47	59	65

Source: CARB (1996, 1997, 1998)

1. (O) = Oakland Alice Street monitoring station.
   (SL) = San Leandro County Hospital monitoring station.
2. Units of measurement for PM_{10} are ug/m^3 (micrograms per cubic meter).
3. Underline indicates exceedance of standard.

3.5 NOISE AND VIBRATION

This section describes the affected environment for noise and vibration. This discussion includes how noise and vibration are measured and reported, criteria for assessing noise levels, and measured and modeled noise and vibration levels at Yerba Buena Island (YBI), Treasure Island (TI), and along the Oakland shoreline. A detailed noise impact assessment technical report has been prepared and is available for review at the locations indicated in the Preface.

3.5.1 Noise

Perception of Noise and Noise Descriptors

A number of factors affect sound as it is perceived by the human ear. These include the actual level of sound (or noise), the frequencies involved, the period of exposure to the noise, and the changes or fluctuations in the noise levels during exposure. Levels of noise are measured in units called decibels (dB). Since the human ear cannot perceive all pitches or frequencies equally well, measured sound levels are adjusted or weighted to correspond to human hearing. This adjusted unit is known as the "A-weighted" decibel. All references to noise in this report refer to A-weighted decibel levels, or dBA.

Very few noises are constant. Most fluctuate in decibel level over short periods of time. One way of describing fluctuating sound is to report the fluctuating noise heard over a specific time period as if it had been a steady, unchanging sound. For this, a descriptor called the Equivalent Sound Level, L_{eq}, is computed. L_{eq} is the constant sound level (A-weighted) that, for a given situation and period (e.g., 1-hour L_{eq}, or 24-hour L_{eq}), conveys the same sound energy as the actual time-varying sound. The 1-hour L_{eq} during the noisiest hour is often used to determine if a traffic noise impact exists and to determine abatement measures for roadway noise, while 24-hour cumulative L_{eq} averaging methods are used to evaluate typical noise exposure in an area.

Traffic Noise

Roadway noise is dependent on many factors: vehicle type and speed, number of vehicles, roadway surface and gradient, distance from the roadway to the receiver, ground surface (whether hard or soft), and shielding due to structures, soundwalls, hills, the edge of a roadway, and earth berms between a receiver and the road. For example, increases in vehicle speed and/or traffic will increase the noise level.

Roadway surface and gradient will also affect traffic noise. Noise from rough and potholed surfaces can be three to four dBA higher than smooth seal-coated surfaces. A steeper road gradient will primarily affect the level of truck traffic noise. The SFOBB generates higher noise levels than a typical roadway, due to the reverberation of sound and vibration within the bridge structure, and the reflection of noise from the upper deck.

Evaluating Noise Levels

Noise impacts are usually assessed by evaluating the total predicted noise level and evaluating differences between the existing and future noise environments. When

evaluating noise increases in the environment, the following relationships to quantifiable increases are used as a basis for assessing impacts.

- Except during carefully controlled laboratory conditions, a change of 1 dBA is very difficult to perceive.
- In the outside environment, a 3 dBA change is considered barely noticeable.
- An increase of 5 dBA is readily perceived as "louder" and is generally required before a change in community response would be expected.
- A 10 dBA increase is perceived as a doubling of noise.
- Caltrans defines an increase of 12 dBA as a "substantial increase."

3.5.2 Land Uses, and Noise- and Vibration-sensitive Receptors

Although the majority of the project area is over Bay waters, the existing and proposed bridge alternatives cross or are near a variety of existing and future land uses, with varying degrees of noise and vibration sensitivity. These are briefly summarized below.

Yerba Buena Island.
The U.S. Navy and the U.S. Coast Guard (USCG) have former and existing residential units on YBI. These include the Navy's residential Quarters 1 through 9, two apartment block units (which are mostly currently vacant), and the USCG's enlisted and officers' quarters. The USCG also maintains various offices, maintenance and repair facilities, and an outdoor tennis court. All of these existing uses are currently exposed to noise and vibration from the existing bridge traffic. Conceptual future plans for YBI anticipate the closure of the Naval Station Treasure Island, and use of the area by the City and County of San Francisco (CCSF) for residential uses, visitor serving attractions, conference facilities, and open space.

Treasure Island.
The northwestern portion of TI was developed for residential uses and includes recreational facilities. The eastern and southern portions of the island include administrative uses, and one of the buildings is currently used for film production. There is an existing recreational marina. Future land use plans, while not specifically defined to date, include entertainment and visitor attraction facilities; film production and industrial use facilitates; hotel, resort, and conference center uses; and potential residential and research and development uses.

Oakland Touchdown Area.
Noise- and vibration-sensitive uses on the Oakland side of the bridge are limited to informal recreational activities such as fishing and wildlife habitat. Currently, there are no formal public shoreline facilities, although the area is used for fishing access and shoreline viewing. The Port of Oakland and the EBRPD are considering creation and management of a park and shoreline access facilities. In addition, public access, in the

form of pedestrian and bicycle access and viewing areas could be developed in this area as a result of previous Caltrans project commitments.

3.5.3 Noise Abatement Criteria and Analysis Guidelines

Federal Highway Administration (FHWA) Noise Abatement Criteria (NAC) for various land use ratings (called activity categories) are given in Table 3.5-1. These noise criteria are assigned to both exterior and interior activities. Noise attenuation provided by most residential structures leads to compliance with the interior NAC if the exterior criterion is attained.[15]

Land uses in the vicinity of the Oakland Touchdown area include industrial and port-related sites, open space lands, wildlife habitat, and potential future park shoreline areas. At YBI, land uses include residences, government offices and buildings, currently unused buildings, and open space. Commercial uses are present on TI. These land uses and exterior NAC correspond to the following FHWA activity categories (exterior uses), according to Table 3.5-1.

- Category B (67 dBA) - Residences, parks, and recreation areas
- Category C (72 dBA) - Developed lands not included in Category B
- Category D (No NAC) - Undeveloped lands

As described in more detail in Section 4.5, if these sound levels are predicted to be approached or exceeded during the noisiest one-hour period, or if the project will result in a substantial (12 decibels or greater) noise increase, noise abatement measures are to be considered and, if found reasonable and feasible, they must be considered for inclusion in the project. A first step in the determination of whether future noise levels will approach or exceed the criteria is to measure noise levels and use this data to establish baseline conditions and calibrate the noise model.

3.5.4 Noise and Vibration Measurements, Model Calibration, and Noise Modeling

The existing noise environment was characterized through the evaluation of field noise measurements. Long-term measurements (at least 24 hours) were made at representative locations (see Figures 3-12 through 3-14 in Appendix A). These included the Navy senior officers' quarters and a cluster of former Navy residential structures north of the bridge, the USCG officer residences, and facilities south of the bridge. A long-term measurement was also made on the north side of the bridge at the Oakland Touchdown area. Thirty-eight short-term measurements (approximately 15 minutes long) were also made at representative locations and land uses. These included residential locations, the USCG administrative offices, historic non-residential buildings, and public shoreline access, and wildlife habitat locations. Additional "special studies" measurements were made below and near the existing bridge and on

[15] Federal Highway Administration, *Procedures for Abatement of Highway Traffic Noise and Construction Noise*, 1982.

the structure near the traffic lanes for use in evaluating bridge noise dynamics and shielding and for evaluation of noise levels that might be experienced on replacement bridge alternatives by bicyclists and pedestrians. The short-term and long-term measurements were used to calibrate the noise model, providing more accurate modeling of existing and future noise levels generated by traffic.

Future peak-hour noise levels were predicted using the "Sound32" noise model. This model is based on the FHWA Noise Prediction Model and uses California Vehicle Noise Emission Levels. Traffic data were developed for the model based on volumes and speed scenarios that would create the loudest peak noise levels. Each scenario was tested, and the "worst-case" traffic speed and volume condition (i.e., 1,600 vehicles per lane per hour traveling at 97 kilometers [60 miles] per hour) was selected for further modeling that created the maximum predicted noise conditions.

Existing vibration measurements were made at five locations, at and near the bridge piers on YBI, and at several points on TI.

Table 3.5-1 Federal Noise Abatement Criteria, Hourly A-Weighted Sound Level - Decibels (dBA)[a]

Activity Category	$L_{eq}^{(h)}$	$L_{10}^{(h)}$	Description of Activity Category
A	57 (Exterior)	60 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	70 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	75 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	--	Undeveloped lands.
E	52 (Interior)	55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: Federal Highway Administration 1982

[a] Either $L_{10}^{(h)}$ or $L_{eq}^{(h)}$, but not both, may be used on a project.

3.5.5 Existing Noise Levels

Generally, the field measurements indicated noise levels in excess of 66 dBA L_{eq} along and near most of the project route. Based on the measured noise levels, noise modeling was performed to predict the highest noise period and level for the peak-noise-hour

traffic conditions for the existing bridge. Following is a summary of the results by geographical area. Table 3.5-2 summarizes the results of the long-term (24-hour) noise measurements. Table 3.5-3 lists the measured short-term (generally 10 to 15 minutes in duration) noise levels, while modeled noise levels for the existing bridge and setting are shown in Table 3.5-4. The data in Table 3.5-4 represents the traffic noise during the peak-noise hour using Level-of-Service C-D traffic volumes and speeds (1,600 vehicles per hour per lane traveling at 97 kilometers [60 miles] per hour). The locations of measured and modeled receptors are shown in Figures 3-12 through 3-14 in Appendix A.

Yerba Buena Island

All of the noise measurements conducted on YBI approached or exceeded the FHWA Noise Abatement Criteria (NAC) for Activity Category B (residences, parks, recreation areas) of 67 dBA L_{eq}, with the exception of the noise measurements taken at the Coast Guard Officers Quarters (Quarters A, B, and C), located southerly of the bridge, west of the existing Coast Guard station. At that location, noise levels ranged from 60 dBA L_{eq} to 62 dBA L_{eq}. Elsewhere, noise levels ranged from 66 dBA L_{eq} to 74 dBA L_{eq}. These noise levels were verified by repeating the measurement one or more times at selected locations. 24-hour noise measurements at YBI ranged from 59 dBA (24-hour L_{eq}) at Location 5 to 72 dBA (24-hour L_{eq}) at Location 1.

Consistent with the measurements, the noise modeling also showed existing peak noise levels that would exceed the NAC for residential locations (Table 3.5-4). Non-residential land uses, such as the Coast Guard administrative complex, have a NAC of 72 dBA (for Category C land uses). The existing peak-hour noise level at Location 7 is predicted at 69 to 71 dBA, and, thus, would approach the criteria under worst-case conditions.

The measured and modeled noise levels are primarily generated by traffic on the existing bridge structure. Specifically, the stacked configuration of the bridge causes traffic noise from the lower deck to be reflected from the upper deck underside, and traffic noise components from both the upper and lower decks are also transmitted downward. The expansion joints in the existing bridge structure were observed to cause additional noise as traffic passes over them.

Treasure Island

A noise measurement was conducted in the parking lot of a film studio located on TI (see Figure 3-13 in Appendix A). This site overlooks the East Span, which is approximately 760 meters (2,500 feet) south of the studio. The measured noise level was 62 dBA L_{eq} at this location, and the noise model indicated the peak-noise-hour level to be 67 dBA L_{eq}. These levels are below the NAC for Activity Category C of 72 dBA L_{eq}.

Oakland Touchdown Area

Measured noise levels in the vicinity of the Oakland Touchdown area ranged from 64 to 71 dBA L_{eq}. Modeling of peak-noise-hour traffic conditions indicated levels of 65 to 74 dBA. Two of the seven noise measurements conducted in the area exceeded the NAC for Activity Category C (the prevalent land use in this area, along with Activity Category D) of 72 dBA L_{eq}. A 24-hour noise measurement conducted at Location 12 resulted in a 24-hour L_{eq} of 71 dBA. Nine of the 14 modeled locations within the Oakland Touchdown area approach or exceed the 72 dBA L_{eq} threshold.

TABLE 3.5-2: LONG TERM NOISE MEASUREMENT DATA SUMMARY

Location	Date	24-Hour L_{eq}(dBA)	Peak Hour L_{eq}(dBA)
1-LT: YBI, Location 1	2/9/98	72	74
2-LT: YBI, Location 2	2/9/98	69	72
5-LT: YBI, Location 5	2/10/98	59	65
6-LT: YBI, Location 6	2/11/98	70	76
12-LT: OT, Location 12	2/11/98	71	73

TABLE 3.5-3: SHORT-TERM NOISE MEASUREMENT DATA SUMMARY

		Measurement Period			Measurement Results
Measurement Location	**Measurement Type**	**Date (month/ day/yr)**	**Start Time (hr:min)**	**Duration (min:sec)**	**Leq (dBA)**
Site1A: YBI: On sidewalk btwn Bldgs. 1 and 2 adjacent to fire hydrant	I-80 Traffic Noise	2/9/98	13:55	15:00	69
Site1B: YBI: Same as 1A	I-80 Traffic Noise	2/10/98	13:45	15:00	71
Site1C: YBI: In center of grassy knoll west of Bldg. 4	I-80 Traffic Noise	2/9/98	14:17	15:00	66
Site 1D: YBI: Same as 1C	I-80 Traffic Noise	2/10/98	13:15	15:00	68
Site 2A: YBI: 10 feet north of edge of bluff approx. 35' S. of bldg.	I-80 Traffic Noise	2/9/98	11:30	15:00	71
Site 2B: YBI: Same as 2A	I-80 Traffic Noise	2/9/98	11:45	15:00	71
Site 2C: YBI: Same as 2A	I-80 Traffic Noise	2/10/98	14:55	15:00	71
Site 3A: YBI: 8' N of garage of Bldg. 267. View of lower deck of I-80	I-80 Traffic Noise	2/9/98	12:30	15:00	71
Site 4A: YBI: Front porch of Quarters at 8 Hillcrest	I-80 Traffic Noise	2/11/98	17:30	10:00	70
Site 4B: YBI: Same as 4A	I-80 Traffic Noise	2/12/98	10:30	10:00	70
Site 5A: YBI: 10' E of Facade of Quarters "B"	I-80 Traffic Noise	2/10/98	12:30	15:00	62
Site 5B: YBI: Same as 5A	I-80 Traffic Noise	2/11/98	12:45	15:00	61
Site 5C: YBI: In front of Quarters "C" ~ 100' from Site 5A	I-80 Traffic Noise	2/11/98	13:02	10:00	61
Site 5D: YBI: @ Quarters A (S.E of quarters B & C)	Aircraft & Local Ambient (I-80 noise is low)	2/11/98	12:45	15:00	60
Site 6A: YBI: ~ 1' from 6-LT location @ SW side of basketball court, N. of USCGS Apts.	I-80 Traffic Noise	2/11/98	14:15	15:00	69
Site 6C: YBI: In center of grassy area surrounded by USCGS Apts.	I-80 Traffic Noise	2/11/98	15:00	15:00	68
Site 7A: YBI: USCGS admin bldgs. N. side facing the bridge	I-80 Traffic Noise	2/11/98	17:05	5:00	67
Site 7B: YBI: Same as 7A	I-80 Traffic Noise	2/11/98	17:15	5:00	67
Site 9A: YBI: In parking lot of Bldg 213	I-80 Traffic Noise	2/9/98	16:50	15:00	73
Site 9B: YBI: Same as 9A	I-80 Traffic Noise	2/11/98	16:00	10:00	73

Note: YBI=Yerba Buena Island; OT=Oakland Touchdown Area; TI=Treasure Island; 1'=0.3048 m

TABLE 3.5-3: SHORT-TERM NOISE MEASUREMENT DATA SUMMARY (Continued)

		Measurement Period			Measurement Results
Measurement Location	**Measurement Type**	**Date (month/ day/yr)**	**Start Time (hr:min)**	**Duration (min:sec)**	**Leq (dBA)**
Site 10A: YBI: Just south of Bldg. 262, (old torpedo factory).	I-80 Traffic Noise	2/9/98	17:30	15:00	74
Site 10B: YBI: Same as 10A	I-80 Traffic Noise	2/11/98	16:47	5:00	74
Site 11A: YBI: @ tennis courts n. of USCGS Apt area	I-80 Traffic Noise	2/11/98	14:35	15:00	71
Site 11C: YBI: In lot just south of Bldg. 40 (sea cadets resi.).	I-80 Traffic Noise	2/11/98	14:50	15:00	73
Site 12A: OT: halfway out on rounded promontory.	I-80 Traffic Noise	2/11/98	11:50	10:00	70
Site 12C: OT: ~ 1 foot from LT-Mic	I-80 Traffic Noise	2/11/98	12:00	15:00	71
Site 13A: OT: 50 feet east of cable station; 25 feet west of end of paved road.	I-80 Traffic Noise	2/11/98	10:10	15:00	70
Site 13C: OT: At fence line near promontory, 10' east of EBMUD chem treatment bldg.	I-80 Traffic Noise	2/11/98	10:38	15:00	71
Site 17A: OT: ~ 60' from w. side of radio bldg, near rear facade line.	I-80 Traffic Noise	2/13/98	11:00	15:00	64
Site 17B: OT: Same as 17A	I-80 Traffic Noise	2/13/98	11:15	6:00	64
Site 18A: OT: 15 feet north of power pole and 100 feet east of cellular site.	I-80 Traffic Noise	2/11/98	11:00	15:00	65
Site 20A: YBI: Center of field.	I-80 Traffic Noise	2/11/98	16:15	6:00	69
Site 21A: YBI: @ fire hydrant H-44 near edge of bluff, bridge overhead.	I-80 Traffic Noise	2/11/98	16:30	10:00	71
Film Studio: TI: ~ 40 feet s. of studio bldg., in parking lot facing bridge	I-80 Traffic Noise, aircraft	2/12/98	14:00	10:00	62
SSMA-A: Special "cyclists measurement": YBI: @ Caltrans emergency service access @ EB (lower deck) I-80.	I-80 Traffic Noise	2/10/98	18:15	15:00	90
SSMA-B: Special "cyclists measurement" #2: YBI: same location.	I-80 Traffic Noise	2/12/98	11:00	10:00	91
SSMA-C: Special "shadow-zone" measurement: YBI: Along Macalla Rd, 90' s. of Site 3A	I-80 Traffic Noise	2/9/98	13:08	14:00	76
SSMA-D: Special "under-bridge" measurement: YBI: Directly under concrete lower deck, s. of intrsctn of Northgate and Macalla Rd	I-80 Traffic Noise	2/9/98	13:00	3:00	69

Note: YBI=Yerba Buena Island; OT=Oakland Touchdown Area; TI=Treasure Island; 1'=0.3048 m

TABLE 3.5-4: SUMMARY OF EXISTING MODELED PEAK-NOISE HOUR NOISE LEVELS

Location #	Noise Receptor	Existing Modeled Peak-Noise Hour Noise Level L_{eq} (dBA)
1	1A	72
	1C	70
	1-LT	71
	1-M1	74
	1-M2	70
	1-M3	69
	1-M4	70
	1-M5	75
2	2A	74
	2-M1	71
3	3A	75
4	4A	72
5	5A	66
	5C	64
	5D	64
	5-M1	67
6	6A	72
	6C	71
	6-M1	72
	6-M2	72
7	7A	69
	7-M1	71
9	9A	76
	9-M1	76
10	10A	77
	10-M1	77
11	11A	75
	11C	77
	11-M1	77
	11-M2	77
	11-M3	77
12	12A	72
	12-M1	71
	12-M2	74
	12-LT	73
13	13A	73
	13C	74
	13-M1	73
	13-M2	71
	13-M3	71
17	17A	66
	17-M1	70
18	18A	69
	18-M1	66
	18-M2	65
20	20A	72
	20-M1	72
21	21A	74
	21-M1	73
	21-M2	73
	21-M3	73
	STUDIO	67

3.5.6 Existing Measured Vibrations

Vibration measurements were made at five locations: at and near the bridge piers at YBI and at several points at TI. Short-term measurements were made during freely flowing traffic conditions to obtain representative vibration levels. The measurements indicated that heavy-duty trucks crossing the bridge were the primary sources of vibration measured at the bridge columns and in the vicinity of the bridge structure. At TI, measured vibration levels were primarily associated with wind and wave action at the shoreline.

3.6 HAZARDOUS WASTES

A Hazardous Wastes Assessment was conducted for the East Span Project to identify potential contaminant sources within and adjacent to the project area that may affect design and construction of the project. For purposes of this assessment, hazardous wastes or materials include hazardous substances as regulated under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), hazardous wastes as regulated under the Resource Conservation and Recovery Act (RCRA), and the California Hazardous Waste Control Law (HWCL), hazardous materials as regulated under the Department of Transportation, and other special wastes regulated under federal, state, and local regulations.

3.6.1 Legal and Regulatory Requirements

The following presents an overview of the major laws and regulations that apply to hazardous waste of the East Span Project.

- The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) or Superfund, as amended by the Superfund Amendments and Reauthorization Act (SARA), was originally passed in 1980. CERCLA created national policies and procedures to identify and remediate sites previously contaminated by the release of hazardous substances. These laws have the effect of holding past and present owners of real property liable for the costs of site investigations and remediation associated with environmental contamination regardless of whether the current owner was responsible for the contamination.

- The Resource Conservation and Recovery Act of 1976 (RCRA) regulates hazardous waste storage, treatment, and disposal sites. The State of California implements the RCRA requirements under authorization from the federal EPA through enforcement of the California Hazardous Waste Control Law, which provides regulations that equal or exceed the federal standards.

- Other potentially relevant environmental laws and regulations include:

  - Clean Water Act (CWA)
  - Safe Drinking Water Act (SDWA)
  - Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
  - Toxic Substance Control Act (TSCA)
  - Clean Air Act (CAA)
  - Various state environmental laws and regulations

In the project area, the Regional Water Quality Control Board (RWQCB) administers federal, state, and local regulations for cleanup of affected surface water, groundwater, and soils that present a threat to water quality. The California Department of Toxic Substances Control (DTSC) is the lead agency for several of the cleanup actions on YBI. The California Occupational Safety and Health Agency (CalOSHA) will be involved in providing oversight for hazardous substance and waste handling during construction.

3.6.2 Existing Data Review

A review of the existing hazardous wastes reports and data was conducted to identify potential hazardous waste concerns that may be affected by the East Span Project alternatives. A summary of these reports can be found in the Hazardous Wastes Assessment, September 1998.

3.6.3 Regulatory Database Search

Publicly available federal and state environmental databases were reviewed to obtain information on the location of potential sites of environmental concern that may adversely affect the project. These sites include registered underground storage tanks (USTs) and leaking underground storage tanks (LUSTs); facilities that use, generate, treat, or dispose of hazardous wastes and/or substances; transporters of hazardous wastes; solid waste landfill sites; and unauthorized spills and releases of regulated substances.

The database search area encompassed a distance that extended from 0.8 to 1.6 kilometers (1/2 to 1 mile) on either side of the project area depending on the type of database listing. Databases reviewed for this report are described in the Hazardous Wastes Assessment.

3.6.4 Historical Information Update and Site Reconnaissance

An evaluation of historical land uses and land use changes in the project area was conducted to identify potential historical contaminant sources. This update included interviews with environmental specialists and current property owners, as well as a historical photographic review.

A site reconnaissance in the project area and vicinity was completed to identify and confirm potential contaminant sources identified in earlier data reviews and to identify potential unreported contaminant sources.

For the portion of the alignments over water, the assessment was limited to a review of existing data. Sediment samples were collected along existing SFOBB piers in 1996.[16]

3.6.5 Potential Sources of Contamination

Potential contaminant sources that were identified through the existing data review were screened to determine their potential to conflict with the project based on the following criteria:

- The occurrence of a documented release based on either public records or physical observation;

[16] *Sediment Sampling and Analysis, San Francisco-Oakland Bay Bridge Seismic Retrofit Project*, November 1996.

- The physical, chemical, and toxicological characteristics of suspected contaminants released and the media potentially affected (soil, water, and air);
- Distance from the project area;
- Nature of proposed design and construction activities in relation to the location and possible impact from a potential contaminant source; and
- Estimated groundwater flow direction and depth.

These criteria were used to eliminate potential sources that were unlikely to conflict with the project. Potential contaminant sources not eliminated during this screening process were recommended for further evaluation.

Table 3.6-1 lists potential contaminant sites on YBI. Figures 3-15a and 3-15b in Appendix A show the locations of known or potential contaminant sources for YBI and the Oakland Touchdown area. The U.S. Navy occupies a significant portion of the project area on YBI. The Navy, as part of an Installation Restoration Program (IRP) for Naval Station Treasure Island (NAVSTA-TI)/YBI, established a Federal Facility Remediation Agreement among the Navy, the California Department of Toxic Substances Control (DTSC), and the Regional Water Quality Control Board (RWQCB). Under this agreement, the Navy agreed to undertake and report on specified tasks associated with environmental assessment and response actions at 25 Installation Restoration (IR) sites under the IRP in accordance with CERCLA.

Table 3.6-2 summarizes the findings of the Oakland Touchdown area hazardous wastes assessment.

Two of the potential contaminant sites are located at the Oakland Army Base which is located in a highly industrialized area. Property adjacent to the Oakland Army Base is used as a maritime shipping facility. An environmental baseline study has been conducted to document the physical condition of the property resulting from the use, storage, and disposal of hazardous substances and petroleum products during the base's history.[17] It was recommended that further investigation be conducted in Parcel 1 to determine the source, and vertical and horizontal extent of the previously detected contamination.

[17] Foster Wheeler, Inc., *Basewide Preliminary Assessment/Site Inspection (PA/SI) Oakland Army Base, Oakland, California*, Vol. I and II, February 1998.

Table 3.6-1 Known and Potential Contaminant Sources - (Yerba Buena Island)

Source Area	Identified Contaminants
IR 8 – Former Sludge Disposal Area	Surface soil contamination from metals (beryllium and lead) and from pesticides.
IR 11 – Former Landfill	Soil/Fill contamination from pesticides, metals, and petroleum hydrocarbons. Groundwater contamination from metals and petroleum hydrocarbons.
IR 13, Section E – Storm Water Off-Shore Sediments	Contamination from storm water discharges. Off-shore sampling complete for Phase II Ecological Risk Assessment (analysis results pending).
IR 29 – East Side Contaminated Bridge Soils	Lead contamination of near-surface soils. Petroleum hydrocarbons detected in soil at select locations.
Building 204/208 LUST Site	Petroleum hydrocarbon contamination from former gas station and adjacent fire station (both demolished).
Building 270 LUST Site	Petroleum hydrocarbon contamination from active LUST site. Additional subsurface investigation pending.
Building 40 LUST Site	Petroleum hydrocarbon in groundwater. Possible upgradient (Site 270) source.
Fuel Delivery Lines near Building 213	Removal report documenting soil contamination from petroleum hydrocarbons and analytical testing is pending.
SFOBB Structure	Lead-based paint.

Source: Parsons Brinckerhoff, Inc., 1998

Table 3.6-2 Known and Potential Contaminant Sources - Oakland Touchdown Area

Source Area	Contaminant
Bridge footings in eastern approach area	Soil: TRPH, PAHs, Pesticides, PCBs, and Lead Groundwater: TRPH, Sb, Cd, Cr, Ni, Ag, and Tl
Army Site #1 - western end of Burma Road in Parcel 1	Soil: TPH as motor oil, PCE
Army Site #2 - 456 m (1,500 ft) east of west end of Burma Road in Parcel 1	Soil: TPH as motor oil
Caltrans Maintenance Facility	Soil: PCBs, TPH
EBMUD Dechlorination Facility	Soil: Sodium Bisulfide
Former Landfill Area (Northwest)	Soil: TPH, VOCs, SVOCs, Pb Groundwater: TPH, SVOCs
Former Landfill Area (Southeast)	Soil: TPH, VOCs, SVOCs, Pb Groundwater: TPH, SVOCs
SFOBB Structure	Lead-based paint

Ag = Silver
Cd = Cadmium
Cr = Chromium
Ni = Nickel
PAHs = Polyaromatic Hydrocarbons
PCBs = Polychlorinated Biphenyl
PCE = Tetrachloroethene
Sb = Antimony
Ti = Titanium
TPH = Total Petroleum Hydrocarbons
TRPH = Total Recoverable Petroleum Hydrocarbons

Source: Parsons Brinckerhoff, Inc., 1998

A Sediment Sampling and Analysis Report was also completed by Caltrans in 1996 for the in-Bay portion of the project area. Sediment sampling and analyses at the SFOBB East Span were performed for Caltrans in 1996 on the upper 2 meters (6 feet) of the Bay sediment along the SFOBB piers. The purpose of the investigation was to collect sediment samples from near the SFOBB East Span piers/caissons that would require dredging for retrofit of the existing bridge, as well as analyze the samples and prepare an investigation report for submittal to the Dredged Materials Management Office (DMMO).

Based on physical, chemical, and bioassay results, it was concluded that the disposal of SFOBB East Span sediments at the Alcatraz disposal site would not cause adverse effects to marine biota. It was therefore recommended that the dredged sediments generated during the seismic retrofit activities at the SFOBB East Span be approved for aquatic disposal at the Alcatraz disposal site (Clayton 1996). The result of this investigation will assist in determining the suitability of sediment encountered during construction of the SFOBB East Span Project for in-Bay disposal.[18]

[18] *Sediment Sampling and Analysis, San Francisco-Oakland Bay Bridge Seismic Retrofit Project* November 1996.

3.7 GEOLOGY AND SEISMICITY

3.7.1 Regional Geologic Setting

The project is located in the Coast Ranges geologic/geomorphic province of central and northern California. The Coast Ranges province extends from approximately 500 kilometers (300 miles) south and 400 kilometers (250 miles) north of the project site. The Coast Ranges province is bordered to the north by the Klamath Mountains, to the south by the Transverse Ranges province, to the west by the Pacific Ocean, and to the east by the Great Valley province.

The Coast Ranges have a general northwest orientation and are characterized by north-northwest trending folds and faults. The province consists of sedimentary, metamorphic, volcanic, and igneous rocks ranging in age from the Jurassic/Cretaceous age (100 to 200 million years ago) to recent.

The San Francisco Bay region is located within a northwesterly oriented geomorphic depression called the San Francisco Bay-Santa Clara Valley depression. This depression and its surrounding mountains all have relatively recent tectonic origin. Formation began about one million years ago (within the Quaternary age). The sea level has fluctuated significantly several times prior to and during Holocene times, and sediments known as Bay mud have been and are currently being deposited under estuarine conditions. The Bay mud consists of unconsolidated to moderately consolidated, saturated, organic-rich silty marine clays. (See Figure 3-16 in Appendix A for a geologic profile of the project area.)

3.7.2 Regional Seismic Setting and Seismicity

The San Francisco Bay Area is one of the more seismically active regions of California. There are at least seven active faults (San Andreas, Hayward, Rodgers Creek, Calaveras, Green Valley, Concord, and Franklin) within 50 kilometers (31 miles) of the project area. The active faults trend northwesterly to the north and display a similar right-lateral, primarily horizontal movement. These faults have generated large, historical earthquakes resulting in major surface disturbances, and segments of these faults have been designated as Special Studies Zones by the California Division of Mines and Geology (Alquist-Priolo Special Studies Zones Act of 1972). Numerous other smaller active faults are present throughout the region but are farther from the project area and not believed to be capable of causing significant earthquake shaking within the project area.

The project area's main geologic structures are associated with two major faults: the San Andreas fault about 14 kilometers (9 miles) to the west and the Hayward fault, which is located about 8 kilometers (5 miles) to the east of the study area. Both faults have had large historic earthquakes. Earthquakes on the San Andreas fault include the 8.25 magnitude (Richter Scale) earthquake on April 18, 1906, and the 7.1 magnitude (Richter Scale) Loma Prieta earthquake on October 17, 1989. These earthquakes caused widespread damage throughout the greater San Francisco Bay Area. The Hayward fault has long been documented as active, with major earthquakes in 1836

and 1868. A maximum credible earthquake (MCE) is the largest earthquake reasonably capable of occurring based on current geological knowledge. The MCE has been estimated for the San Andreas fault at 8.0 and 7-1/4 on the Hayward fault.

3.7.3 Geology and Geotechnical Conditions in the Project Area

Yerba Buena Island

YBI is a naturally occurring island approximately 60 hectares (147 acres) in size. The change in topography of the island is extreme, with steep slopes over short distances. The elevations range from 103 meters (338 feet) near the center of the island to sea level. Slopes range from five to 75 percent. The USCG land along the southeast shore occupies the flattest area of the island and has been enlarged through the placement of fill material.

The island is underlain by Franciscan Formation basement rocks consisting of interbedded graywacke sandstone, mudstone, and claystone of varying proportions. On YBI, the majority of the Franciscan Formation is covered with unlithified sand and alluvial deposits, along with localized areas of artificial fill. There are several Franciscan Formation outcrops on YBI. The unconsolidated sedimentary deposits consist of silty sand with interbeds of clayey sand and clayey silt. Areas of artificial fill surrounding YBI, such as TI and the USCG station were created by placing dredged Bay deposits and cut materials from YBI in relatively shallow water areas to create emergent usable pads.

Slope Stability. Existing landslides have been identified at various locations on YBI and appear to range from older, probably prehistoric, failures to recent failures. The modes of the slope failures include discontinuity-controlled rock failures (due to weakness in the rock), relatively deep-seated rotational landslides, and relatively surficial failures. Rock-wedge failures have occurred in the Franciscan Formation slopes surrounding the northeast point and eastern YBI Tunnel approach. The sizes of the rock-wedge failures are variable and range up to in excess of 30 meters (100 feet) in width and length. Of most concern is a larger rock-wedge failure in the vicinity of the proposed west pier for the northern alignments. Relatively deep-seated rotational landslides are located on the west and northwest of the eastern YBI Tunnel approach area but appear to have occurred outside of the project study area. The landslides appear to be older and probably failed prehistorically. A number of relatively shallow slope failures are located in unconsolidated sedimentary deposits on the southwest slope of the eastern YBI Tunnel approach above the USCG station. These landslides are up to 45 meters (150 feet) high, 61 meters (200 feet) wide, and 6 meters (20 feet) thick.[19] Some of the landslides have occurred recently. Additional debris-flow failures and zones of shallow creeping soils have been identified in the Franciscan Formation on the northwest and southeast slopes of the eastern YBI Tunnel approach and on the east and north facing slopes of the northeast point.

[19] Fugro and Earth Mechanics, *Preliminary Yerba Buena Island Geotechnical Site Characterization Report San Francisco-Oakland Bay Bridge East Span Seismic Safety Project*, June 1998.

In-Bay Portion of the Project Area

In general, the area has a westerly thinning sequence of Holocene- and Pleistocene-age marine and alluvial sediments overlaying Franciscan Formation bedrock, which ranges from near the surface at YBI to over 100 meters (328 feet) below the Bay bottom near the Oakland Touchdown. The marine sediments are primarily clays and silts, while the alluvial sediments are more commonly sands. The Holocene- and Pleistocene-age sequence in some areas of the study area has been eroded by various episodes of channeling. In general, marine clays are thicker and the alluvial sands are thinner (or absent) within buried paleochannels.

Oakland Touchdown

The eastern approach to the San Francisco-Oakland Bay Bridge (SFOBB) sits on a man-made spit that extends out into San Francisco Bay. The site is generally flat, rising approximately 1.5 to 3 meters (5 to 10 feet) above sea level. The area is a former tidal flat that was filled prior to the construction of the existing SFOBB in the 1930s. The source of the fill is not known, but was likely a combination of dredged soil and imported fill, including some rubble and other debris. Due to the fill, settlement of the underlying Young Bay mud has likely occurred, creating mud that is stronger than its nearby marine counterpart.

The Franciscan Formation in this area is deep (an elevation of -135 to -150 meters [-440 to -500 feet]) and slopes gently to the east/southeast.[20] A sequence of Holocene- and Pleistocene-age marine and alluvial sediments overlie the bedrock. The subsurface soils vary and consist of generally less than 3 meters (10 feet) of loose, sandy fill that is underlain by a very soft, saturated layer of Bay mud that extends down to approximately 12 meters (40 feet).[21,22] In other areas, the soil is composed of coarser grain sediments that include various amounts of gravel. The primary material in the underlying Merritt-Posey-San Antonio Formation at the Oakland Touchdown is a layer of dense sand of approximately 4.5 to 6.1 meters (15 to 20 feet) thick. A north-south trending paleochannel exists under the Oakland Touchdown area. This paleochannel does not appear to contain alluvial sands.

3.7.4 Tsunamis

Tsunamis are seismically induced "sea waves" that are generated when large subsea earth or rock masses are displaced during earthquakes or very large landslides. The low-amplitude, very-long-period waves travel very quickly and increase significantly in size and height upon entering shallow water. The waves can cause significant damage to coastal areas.

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[20] Fugro and Earth Mechanics, *Preliminary Oakland Shore Approach Geotechnical Site Characterization Report San Francisco-Oakland Bay Bridge East Span Seismic Safety Project*, June 1998.

[21] Apex, *Report Site Investigation San Francisco-Oakland Bay Bridge, East Bay Span, Oakland, California*, State of California, Department of Transportation, March 1994.

[22] Olivia Chen Consultants, *EBMUD Sodium Bisulfite Facilities for Main WWTP Geotechnical Findings and Foundation Recommendations*, CH2M Hill, September 1995.

A map prepared in 1972 by the U.S. Geological Survey (USGS), entitled "Maps Showing Areas of Potential Inundation by Tsunamis in the San Francisco Bay Region, California," shows the Oakland Touchdown area would be inundated with about 3.1 to 3.7 meters (10 to 12 feet) of water if a 6.1-meter (20-foot) wave were to occur at the Golden Gate. (A 6.1-meter [20-foot] wave approximates the run-up that occurred at Crescent City, California, due to the 1964 Alaska earthquake.) Given the hypothetical nature of the information, it is likely the inundation level at the Oakland Touchdown area would be lower, at a level closer to 1 meter (3.3 feet).[23]

According to the USGS map, the portion of the bridge on YBI would not be inundated by a 6.1-meter (20-foot) tsunami, although lower-lying fill areas such as the USCG station could be subject to damage.

[23] Source: Gerry Houlihan, T. Y. Lin International, Inc.

3.8 WATER RESOURCES AND QUALITY

3.8.1 Regulatory Setting

Federal

The discharge of any pollutants to waters of the United States is regulated, under the Federal Water Pollution Control Act, by the National Pollutant Discharge Elimination System (NPDES) Program. The U.S. Environmental Protection Agency (EPA) administers the NPDES program in the nation, and it has given regulatory authority to those states with a local regulatory body. (See State discussion below for further details.)

Sections 401 and 404 of the Federal Clean Water Act also apply to the San Francisco-Oakland Bay Bridge (SFOBB) East Span Project. Under the Section 401 Water Quality Certification Program, every applicant for a federal permit or license for an activity which may result in a discharge into a water body must request state certification that the proposed activity will not violate state and federal water quality standards. Section 404 authorizes the U.S. Army Corps of Engineers (ACOE) to issue permits regulating the discharge of dredged or fill material into the waters of the U.S., including wetlands.

Section 9 of the Rivers and Harbors Act of 1899 is another federal regulation that would apply to the East Span Project. Section 9 prohibits the construction of any bridge, dam, dike, or causeway over or in navigable waterways of the U.S. without Congressional approval. Administration of Section 9 has been delegated to the U.S. Coast Guard (USCG).

The Coastal Zone Management Act created a broad program based on land development controls within coastal zones. Implementation occurs through individual state programs, as discussed below.

State

In the State of California, under the Porter-Cologne Water Quality Control Act, the State Water Resources Control Board has the ultimate authority over state water rights and water quality policy. The NPDES program in California is implemented by the State Water Resources Control Board through its nine Regional Water Quality Control Boards (also established under the Porter-Cologne Act).

An NPDES permit is required for any proposed waste discharges or storm water discharges from municipal areas with populations of 100,000 or more to surface waters and from construction activities disturbing 2 hectares (5 acres) or more of land. The East Span Project is located within the boundaries of the San Francisco Bay Regional Water Quality Control Board (RWQCB) and requires an NPDES permit. Caltrans District 4 currently operates under NPDES Permit No. CAS029998, which covers all Caltrans activities within the boundaries of the RWQCB's jurisdiction. As a result, the East Span Project is covered under this NPDES permit.

The RWQCB has adopted a Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan), which sets forth water quality objectives to protect and enhance the

beneficial uses of the Bay and its tributaries. Beneficial uses of the waters in the San Francisco Bay include commercial and sport fishing, estuarine habitat, industrial service and process supply, fish migration, navigation, preservation of rare and endangered species, recreation, shellfish harvesting, fish spawning, and wildlife habitat. Water quality objectives include parameters such as bacteria, bioaccumulation, biostimulatory substances, color, dissolved oxygen, floating material, oil and grease, population and community ecology, pH, salinity, sediment, suspended material, settleable material, sulfide, temperature, toxicity, turbidity, and un-ionized ammonia.

The California Coastal Act (CCA) is California's coastal zone management program. The CCA established the California Coastal Commission as having jurisdiction over California's coastal zone. The San Francisco Bay Conservation and Development Commission (BCDC) issues federal consistency determinations under the Coastal Zone Management Act for projects within its jurisdiction. The East Span Seismic Safety Project is within BCDC's jurisdiction. Project compliance with the Coastal Zone Management Act is addressed through BCDC's permitting process. Caltrans will obtain a consistency determination from BCDC prior to the project construction.

The McAteer-Petris Act created the BCDC as a response to haphazard and uncoordinated filling of the San Francisco Bay. The primary purpose of the act is to promote responsible planning and regulation of the San Francisco Bay. The act emphasizes the elimination of the unnecessary placement of fill in the Bay, the use of the Bay for water-oriented uses, and the inclusion of public access consistent with a proposed project. In 1968, BCDC prepared the federally approved San Francisco Bay Plan which established policies to guide development in and along the Bay through a permitting process (see Section 3.1.3). The act requires that a project have permits to fill, to extract materials, and to make substantial changes in use of land, water, or existing structures in the Bay.

3.8.2 Existing Drainage Patterns and Water Quality

The San Francisco Bay has a drainage area of many thousand square kilometers (miles). It is the primary point of outfall to the Pacific Ocean for a large portion of California.

Flood Flows

Flood flows are not defined beneath the SFOBB. The influence of flood flows on the project area is minimal because of the location in relation to the tributary streams to the San Francisco Bay.

Tidal Influences

Central San Francisco Bay, in the vicinity of the East Span Project, is influenced by the tides of the Bay. The frequency and height of tides throughout the Bay have been estimated by the ACOE.[24] Table 3.8-1 summarizes the tidal elevations for the Bay, as measured at two tide measuring stations in the project area.

[24] U.S. Army Corps of Engineers, *San Francisco Bay, Tidal Stage vs. Frequency Study,* October 1984.

Table 3.8-1 High Tide Elevation

	Station			
	Matson Wharf[1]		Yerba Buena Island[1]	
Frequency	**meters[2,3]**	**feet[2,3]**	**meters[2,3]**	**feet[2,3]**
10-year	1.80	5.9	1.80	5.9
50-year (interpolated)	1.89	6.2	1.89	6.2
100-year	1.92	6.3	1.92	6.3
100-year (adopted)	**1.98**	**6.5**	**1.98**	**6.5**
500-year	2.01	6.6	2.01	6.6

Source: U.S. Army Corps of Engineers, 1984.

[1] Matson Wharf (Station 4779) is located in the Oakland Touchdown area. The YBI station is Station 4782.
[2] Elevations per NGVD (National Geodetic Vertical Datum).
[3] To estimate elevations above mean lower low water, add an additional 0.896 meter (2.94 feet) to the values in the table.

The high tide elevations presented in Table 3.8-1 are based on historical tidal data. The EPA and other agencies believe that concentrations of atmospheric gases will continue to increase in the coming decades, resulting in global warming and subsequent thermal expansion, which will cause the sea level to rise. The ACOE has made an attempt to adjust the predicted tidal elevations based on historical data to include this expected increase in sea level. Table 3.8-2 shows high tide elevations that have been adjusted for expected increases in sea level.

Table 3.8-2 Tidal Elevations Including Estimated Sea Level Rise

	Planning Year			
	Year 2000		Year 2050	
Frequency	**meters**	**feet**	**meters**	**feet**
10-year	1.89-1.92	6.2-6.3	2.32-2.60	7.6-8.53
50-year (interpolated)	1.98-2.01	6.5-6.6	2.41-2.69	7.90-8.83
100-year	2.01-2.04	6.6-6.7	2.44-2.72	8.00-8.92
100-year (adopted)[1]	**2.07-2.10**	**6.8-6.9**	**2.50-2.78**	**8.20-9.12**
500-year	2.10-2.13	6.9-7.0	2.53-2.84	8.30-9.33

Source: U.S. Army Corps of Engineers, 1984.
Notes: Year 2000 estimated rise 0.09-0.12m (0.3-0.4ft); Year 2050 estimated rise 0.52-0.80m (1.7-2.6ft).
Elevations per NGVD (National Geodetic Vertical Datum).

[1] The values presented in the table are from the U.S. Army Corps of Engineers. Data from the San Francisco Bay Conservation and Development Commission[25] can also be extrapolated to obtain tidal elevation values for the planning years 2000 and 2050. These values would be 2.04 meters (6.7 feet) for the year 2000 and 2.19 meters (7.2 feet) for the year 2050. These lower values were used in the design planning process for the East Span Project.

[25] San Francisco Bay Conservation and Development Commission, *Sea Level Rise: Predictions and Implications for San Francisco Bay*, October 1988, revised.

Surface Water Quality

The surface water body in the project area is the Central San Francisco Bay, which connects to the Pacific Ocean through the Golden Gate Channel. Surface runoff from the project area flows directly or indirectly into the Central San Francisco Bay. The surface runoff is composed of freeway runoff from the SFOBB and I-80 and the toll plaza, urban runoff from adjacent streets, and the land runoff from adjacent industrial sites and open areas. Other discharges to the Central San Francisco Bay include discharges from municipal wastewater treatment plants, discharges from dredging operations, and discharges from other industrial processes.

Surface water quality throughout the estuary (San Francisco Bay) has been evaluated, to a limited extent, by the San Francisco Estuary Institute (SFEI), through the Regional Monitoring Program (RMP). The YBI station is located in the project area. In addition, three other stations are located in the vicinity of the project study area. These stations are: Alameda Station, located upstream of the project area; Point Isabel Station, located downstream of the project area toward the central Bay, and Horseshoe Bay Station, located downstream of the project area toward the Golden Gate Channel.

The SFEI 1996 Annual Report[26] covers the fourth year of the RMP. The results for the 1996 study period indicate that, in general, there are water quality variations from season to season. Table 3.8-3 presents a summary of the concentrations of various pollutants in the Central Bay monitored in 1996.

3.8.3 Groundwater

The east end of the project, at the Oakland Touchdown, lies over the East Bay Plain groundwater basin in Alameda County. Existing and potential beneficial uses of this regional basin include municipal and domestic water supply, industrial service water supply, industrial process water supply, and agricultural water supply. The East Bay Plain extends over an area of 295 square kilometers (114 square miles), with an average depth to aquifer below land surface ranging between 8 meters (25 feet) and 183 meters (596 feet), and a storage capacity of 3.4 billion cubic meters (2,770,000 acre-feet).

RWQCB groundwater quality objectives consist primarily of narrative objectives with a limited number of numerical objectives. The maintenance of existing groundwater quality is the primary objective. In addition, at a minimum, groundwater shall not contain concentrations of bacteria, chemical constituents, radioactivity, or substances producing taste and odor in excess of the objectives unless naturally occurring background concentrations are greater. In the central groundwater basin, which contains the East Bay Plain, the nitrate concentration shall be less than 45 mg/L and the concentration of total dissolved solids (TDS) shall be less than the background concentration or 500 mg/L, whichever is lower. Additionally, the RWQCB has the authority to establish basin and/or site-specific numerical groundwater objectives as necessary.

[26] San Francisco Estuary Institute, 1996 Annual Report, Regional Monitoring Program, 1997.

Table 3.8-3 Central San Francisco Bay Surface Water Concentrations

Pollutant	Range of Concentrations	Water Quality Objective
Salinity	5-32 parts per thousand	Controllable water quality factors shall not increase salinity of waters so as to adversely affect beneficial uses.
Total Suspended Solids	2-25 ug/L	Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.
Dissolved Organic Carbon	960-3,840 ug/L	No objective
Nutrients: ammonia	10.92-159.46 ug/L	Annual mean 0.025 mg/L, maximum 0.16 mg/L
nitrite	185.64-487.34 ug/L	No objective
nitrate	9.24-58.8 ug/L	No objective
phosphate	59.83-207.7 ug/L	No objective
Trace Elements: arsenic	1.5-2.1 ug/L	4-day average 36.0 ug/L, 1-hour average 69.0 ug/L
cadmium	0.03-0.10 ug/L	4-day average 9.3 ug/L, 1-hour average 43.0 ug/L
chromium	0.1-3 ug/L	4-day average 50.0 ug/L, 1-hour average 1100.0 ug/L
copper	0.4-3.3 ug/L	1-hour average 4.9 ug/L
lead	0.05-0.9 ug/L	4-day average 5.6 ug/L, 1-hour average 140.0 ug/L
nickel	0.5-7 ug/L	24-hour average 7.1 ug/L, instantaneous 140.0 ug/L
zinc	0.3-8 ug/L	24-hour average 58.0 ug/L, instantaneous 170.0 ug/L

Source: Caltrans District 4, April 1998.
Note: ug/L = microgram per liter

3.9 NATURAL RESOURCES

This section addresses existing vegetation communities and associated wildlife, special status plant and wildlife species, wetlands, and non-wetlands waters of the United States that occur in the project area. Detailed survey information is provided in the Natural Environment Study and Biological Assessment.

3.9.1 Regulatory Setting

Natural resources in the project area were evaluated in accordance with the provisions of state and federal environmental statutes and regulations. These include the Federal Endangered Species Act of 1973, as amended, the California Endangered Species Act of 1985, the Clean Water Act (Section 404), the Federal Rivers and Harbors Act of 1899, the Marine Mammal Protection Act, the Migratory Bird Treaty Act, the McAteer-Petris Act, the National Environmental Policy Act, and Executive Order 11990 (Protection of Wetlands).

3.9.2 Terrestrial Vegetative Communities and Wildlife

Most of the terrestrial vegetation within the project area consists of non-native plant species. Patches of native vegetation occur on Yerba Buena Island (YBI) and include coast live oak woodland, northern coastal scrub, and northern coastal saltmarsh. Mudflats in the study area are found along the south side of YBI and along the north side of the Oakland Touchdown area. The Oakland Touchdown area consists primarily of ruderal vegetation, occurring at the Oakland Army Base property. Small patches of northern foredune and landscaped vegetation occurs along the north side of the Oakland Touchdown area. Figures 3-17 and 3-18 in Appendix A show the habitat types in the project area. Terrestrial vegetative communities and associated wildlife species are summarized below.

Landscaped Non-Native Plant Communities

Typical landscaped species found on YBI include Tasmanian blue gum (*Eucalyptus* sp.), German ivy (*Senecio mikanioides*), and Monterey cypress (*Cupressus macrocarpa*). Native plant species are largely excluded from these areas due to several factors, including lack of light due to the density of the overstory canopy, accumulation of debris from overstory trees, human disturbance, and poor soil conditions. Landscaped vegetation is not considered to be sensitive habitat for plant or wildlife species. Common wildlife species that occur in landscaped areas include the European starling (*Sturnus vulgaris*), house sparrow (*Passer domesticus*), Anna's hummingbird (*Calpte anna*), Virginia opossum (*Didelphis virginiana*), Norway rat (*Rattus norvegicus*), and striped skunk (*Mephitis mephitis*).

Ruderal Vegetation

Areas that have been heavily disturbed contain ruderal vegetation generally characterized by herbaceous, non-woody species. This vegetation occurs along the Oakland Touchdown area on the Oakland Army Base property. Hard-packed mud areas occur within this vegetation and provide valuable upland resting areas, refugia, for shorebird species during high tides. Some of the shorebird species known to use

these areas include western sandpiper (*Calidris mauri*), semipalmated plover (*Charadrius semipalmatus*), and dunlin (*Calidris alpina*).[27]

Coast Live Oak Woodland

Only a few tree and shrub species that are associated with coast live oak woodland occur in small patches on YBI, near Macalla Road. Species present include toyon (*Heteromeles arbutifolia*), blue elderberry (*Sambucus sp.*), California hazelnut (*Corylus cornuta*), and a few California buckeye (*Aesculus californica*). Understory plant species observed include native species such as poison oak (*Toxicodendron diversilobum*) and California blackberry (*Rubus ursinus*). Non-native plant species observed within the coast live oak woodland include German ivy, Himalayan blackberry (*Rubus discolor*), and Tasmanian blue gum.

Typical wildlife species associated with coast live oak woodland include northern flicker (*Colaptes auratus*), mourning dove (*Zenaida macroura*), western gray squirrel (*Sciurus griseus*), western fence lizard (*Sceloporus occidentalis*), and gopher snake (*Pitouphis melanoleucus*).

Northern Coastal Scrub

A few patches of northern coastal scrub occur on steep bluffs along the east end of YBI. The dominant plant species in this area is California sagebrush (*Artemisia californica*). Common plant species include farinosa dudleya (*Dudleya farinosa*), yarrow (*Achillea millefolium*), and seaside woolly sunflower (*Eriophyllum staechadifolium*). Wildlife species that could be expected to occur in coastal scrub habitat include white-crowned sparrow (*Zonotrichia leucophrys*), bewick's wren (*Thryomanes bewickii*), and vagrant shrew (*Sorex vagrans*).

Northern Coastal Salt Marsh

A small narrow band of northern coastal salt marsh occurs on the northern side of YBI. Dominant plant species include pickleweed (*Salicornia virginica*) and saltgrass (*Distichilis spicata*). Animals that have the potential to occur within coastal salt marsh vegetation, including the northern salt marsh harvest mouse, do not occur within this narrow band of habitat because of its small size.

This vegetative community also occurs within the Emeryville Crescent, adjacent to the Oakland Touchdown area, outside of the project area. Salt marsh habitat along the Emeryville Cresent provides important breeding and foraging habitat for a variety of migratory and resident wildlife species. Migratory bird species common to salt marsh habitat include northern pintail (*Anas acuta*), mallard (*Anas platyrhynchos*), least sandpiper (*Calidris minutilla*), and willet (*Catoptrophorus semipalmatus*). Resident species that commonly use this habitat include great blue heron (*Ardea herodias*), marsh wren (*Cistothorus palustris*), red-winged blackbird (*Agelaius phoeniceus*), and California red-backed vole (*Clethrionomys californicus*).

[27] Caltrans, Memorandum regarding Wintering Bird Surveys Along the Cypress Reconstruction Mitigation Bike Path, August 1995.

Northern Foredunes

A patch of northern foredunes is located on the northern shoreline of the Oakland Touchdown area at Radio Point Beach. The dominant plant species include beach bur (*Ambrosia chamissonis*), fig-marigold (*Carpobrotius edulis*), and saltgrass. A band of marsh gumplant (*Grindelia stricta* var. *angustifolia*), a California Native Plant Society (CNPS) List 4 species, occurs in a depression behind the foredune area. This area is bound by potential jurisdictional wetlands and large patches of fig-marigold.

Intertidal Mudflats

Within the project area, mudflats are found along the northern side of the Oakland Touchdown area and on the southern side of YBI. Mudflats are exposed at extremely low tides and inundated at high tides. Mudflats are either unvegetated or vegetated only by algal mats (40 CFR 230.42). Mudflat areas around the Bay and near the project area provide important feeding habitat during the winter months for many species of shorebirds.

3.9.3 Estuarine Environment and Associated Species

The San Francisco-Oakland Bay Bridge (SFOBB) is located in the middle of the San Francisco Bay Estuary. The estuary is commonly divided into several segments (listed from north to south): the Suisun Bay, Carquinez Strait, San Pablo Bay, Central Bay, and South Bay. The San Francisco Bay Estuary sits at the terminus of the Sacramento-San Joaquin Delta, a drainage basin system which covers 40 percent of the land area of California. The San Francisco Bay Estuary and the Sacramento-San Joaquin Delta together form one of the largest estuarine systems in North America. Aquatic habitats in the estuary range from deep channel bottoms to shallow marsh pools.

Several species of waterfowl use this habitat in the winter months, including lesser scaup (*Aythya affinis*), surf scoter (*Melanitta perspicillata*), and canvasback (*Aythya valisineria*). Other avian species that are often observed in the project area include brown pelican (*Pelecanus occidentalis*) and western gull (*Larus occidentalis*). A common marine mammal found foraging in the project area is the harbor seal (*Phoca vitulina*).

Open Water

The SFOBB is located in the Central Bay segment of the San Francisco Bay Estuary. The Central Bay is characterized by waters that are cold, saline, and low in total suspended sediment. This section of the estuary is strongly influenced by tidal currents, due to its proximity to the Pacific Ocean. Fish swim through the Central Bay on their way to and from the entrapment zone, an area where fresh water flows from the Delta mix with brackish water flows from the estuary, trapping sediment and phytoplankton in the water column. Because nutrients and phytoplankton are concentrated in this area, it is considered to be especially important to fish species which come to this area to feed. The location of the entrapment zone fluctuates within the estuary as freshwater outflow from the Delta changes in volume. Open water is the largest natural habitat found in the project area.

Fisheries. Although most populations of Bay/Delta fish species have been severely reduced, several species of anadromous, marine, and estuarine species use the Bay/Delta for part of their life cycle. Anadromous species in the Central Bay, such as the native Chinook salmon (*Oncorhynchus tshawytscha*) and delta smelt (*Hypomesus transpacificus*), migrate through the open water areas of the Bay on their way to and from the tributaries of the Delta. Marine species common to the Central Bay include the Northern anchovy (*Engraulis mordax*) and Pacific herring (*Clupea harengeus*).

Plankton. Phytoplankton in the San Francisco Bay Estuary are consumed by organisms including clams, worms, mussels, and shrimp-like zooplankton called copepods. Zooplankton, in turn, are consumed by a variety of fish species and are especially important to the survival of juvenile fish. Important species of zooplankton in the Central Bay include the ghost shrimp and the shrimp-like euphausiids, commonly known as krill. Phytoplankton growth in the Bay is controlled primarily by the availability of light required for photosynthesis. A combination of factors, including water depth and transparency, river inflow, and freshwater export from the Delta, influence the ability of phytoplankton to receive adequate light for photosynthesis. These factors influence the productivity and concentrations of phytoplankton throughout the various regions of the Bay. Phytoplankton levels in the Central Bay generally remain low due to the high degree of tidal water exchange and mixing. However, diatoms may become abundant in the Central and South Bays during the spring when diatom blooms are occurring in coastal waters due to upwelling.

Benthos. Benthic organisms are filter feeders that strain phytoplankton and detritus from the water column and graze on nutrients that fall to the bottom sediment. A broad range of species are commonly found in the Bay along mudflats, the bottom of open water areas, and on hard surfaces below the intertidal zone. Some benthic organisms, such as worms, burrow into the bottom sediment and others, such as oysters, crabs, flat worms, and copepods, live on the sediment surface. Others, including mussels, live on hard surfaces such as rocks and pilings. Existing submerged bridge structures and rocky outcrops may provide substrate for benthic invertebrates, including the bay mussel.

3.9.4 Wetlands and Waters of the United States

Wetland resources in the project study area include "special aquatic sites" regulated by the Army Corps of Engineers (ACOE) under Section 404 of the federal Clean Water Act and waters of the U.S. regulated under Section 10 of the Rivers and Harbors Act. Special aquatic sites found in the project area include wetlands, mudflats, and vegetated shallows such as eelgrass in estuarine systems. A delineation of jurisdictional wetlands, mudflats, and eelgrass beds was conducted in the project area. Potential jurisdictional wetlands were delineated in the field using methods outlined in the ACOE Wetland Delineation Manual.[28] 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. Eelgrass beds

[28] Environmental Laboratory, *Corps of Engineers Wetlands Delineation Manual,* Technical Report Y-87-1, U.S. Army Engineer Waterways Experiments Station, 1987.

were delineated in the field during Mean Low Water (MLW) when the potential for observing the edge of eelgrass beds or individual stands is easiest. Fathometer surveys and bottom grab samples were taken when eelgrass was not apparent on the water surface or when visibility was not suitable to determine eelgrass distribution. Eelgrass beds are present in the San Francisco Bay Estuary from Mean Lower Low Water (MLLW), elevation -0.9 meter (2.87 feet) NGVD to 1.5 meters (5 feet) below MLLW.

Mudflats were delineated and are present in the project area between the Mean High Water (MHW) line, elevation at 0.8 meter (2.63 feet) NGVD, and the MLLW. Special aquatic sites and waters of the U.S. in the project area are shown on Figures 3-19 and 3-20 in Appendix A. The following is a description of the wetlands, mudflats, eelgrass beds, and waters of the U.S. in the project area.

Wetlands

The total area of jurisdictional wetlands in the project area is 0.06 hectare (0.15 acre). There are three wetland sites in the project area. 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 project area boundary to the northeast. Vegetation in this area consists of saltgrass and searocket (*Cakile maritima)*, both considered wetland indicator species. This vegetation is growing at or slightly above the high tide line. A muted-tidal wetland occurs behind the foredune area outside of the project area (wetland sample point B-1). A small non-tidal wetland area occurs within the project area on Port of Oakland property, located just south of the existing highway. The wetland area at this site is 0.03 hectare (0.07 acre) and includes rabbit foot grass (*Polypogon monspeliensis)*, a wetland indicator species. 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. West of this site exists another non-tidal wetland area also located on Port of Oakland property. This wetland is 0.02 hectare (0.03 acre) and consists of wetland indicator plants, including buttons (*Cotula coronopifolia*), sourclover (*Melitotus indica*), and rabbit foot grass.

Another small band of tidal wetlands occurs on the north side of YBI. This wetland band extends for approximately 90 meters (295 feet) along the high-tide line and is approximately 1 meter (3.28 feet) wide. The total wetland area is approximately 0.01 hectare (0.03 acre). Wetland vegetation in this wetland area is comprised of pickleweed, fat hen (*Atriplex triangulars)*, and saltgrass. This wetland area is described as northern coastal salt marsh in Section 3.9.2. Animal species associated with northern coastal salt marsh vegetation do not occur within this narrow band of wetland due to its small size.

Wetlands 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 wetland 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. The following are a few standard functions used to assess each wetland type:

- Wildlife diversity/abundance,
- Aquatic diversity/abundance,
- Uniqueness/heritage.

The tidal wetlands present in the project study area are likely to be remnant wetlands surrounded by non-native species. Compared to the tidal wetlands located in the Emeryville Crescent, tidal wetlands in the project area do not provide extensive habitat for wildlife and, therefore, functions and values are limited. The non-tidal wetland area is also characterized by 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.

Mudflats

Mudflats occur along the north side of the Oakland Touchdown area at the eastern bridge abutment and along the southeast side of YBI, 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 acre) of mudflats is located along the beach, east of the Coast Guard station on YBI. The mudflat areas located along the north side of the Oakland Touchdown area and along the southeast side of YBI provide a high level of functions and values as foraging habitat for a variety of bird species.

Eelgrass

Eelgrass beds are known to occur in shallow waters within the project area.[29] These areas are considered special aquatic sites under Section 404 of the federal Clean Water Act. Eelgrass provides important nursery habitat and protection for many fish and invertebrate species. In addition, avian species are often observed foraging among vegetated shallows. Eelgrass vegetates shallow, gradually sloping sand, sand/mud, and sand/shell debris habitats. A delineation of eelgrass beds was performed for the project area; locations of eelgrass beds are shown on Figures 3-17 and 3-18 in Appendix A. The distribution of eelgrass on the north side of the Oakland Touchdown area extends in depths ranging from about 1.1 to 1.5 meters (3.5 to 5.0 feet). Eelgrass beds in this area are patchy, occurring within 3.0 to 4.6 meters (10 to 15 feet) of each other. This eelgrass bed contained individual patches of eelgrass varying from 1.5 to 3.6 meters (5 to 12 feet) in diameter. Eelgrass near the shore of the Oakland Touchdown appears to be young, which suggests that the eelgrass bed is growing in size and density.

[29] Long-Term Management Strategy (LTMS) Multi-Agency Writing Team. *Draft Long-Term Management Strategy (LTMS) for the Placement of Dredge Material in the San Francisco Bay Region.* Vol. I and II. (Report prepared for the LTMS Management Protection Agency, Region 9, USACOE, San Francisco District; San Francisco Bay Conservation and Development Commission; San Francisco Bay Regional Water Quality Control Board; and California State Water Resources Control Board). April 1996.

Four eelgrass bed areas were delineated near YBI. Eelgrass beds in this area occur in a continuous manner along the edge of the shoreline and extend to areas no greater in depth than 1.1 to 1.5 meters (3.5 to 5.0 feet).

Approximately 1.5 hectares (3.6 acres) occur adjacent to YBI and approximately 22.3 hectares (55.1 acres) occur north of the Oakland Touchdown area.

Waters of the U.S

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 waters of the U.S. also provide valuable habitat for aquatic organisms and wildlife. The project area is bisected by a navigation channel that is under the jurisdiction of the USCG. Section 10 jurisdiction extends to the mean high water mark on the north and south sides of the SFOBB. Section 404 jurisdiction extends to the High-Tide Line (HTL) on the north and south sides of the bridge. Special aquatic sites, including mudflats and eelgrass beds, are under Section 10 and Section 404 jurisdiction.

3.9.5 Jurisdiction of the Bay Conservation and Development Commission

Areas subject to jurisdiction of Bay Conservation and Development Commission (BCDC) under the McAteer-Petris Act extend 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. In addition, BDCD's San Francisco Bay jurisdiction includes subtidal areas, intertidal areas, and tidal marsh areas which are between mean high tide and 1.5 meters (5 feet) above the MSL. For the SFOBB project, the area subject to BCDC jurisdiction includes the YBI and Oakland Touchdown area shoreline.

3.9.6 Special Status Species

Special status species include plant and wildlife species protected under federal and state Endangered Species Acts, Migratory Bird Treaty Act, and the Marine Mammal Protection Act. This section identifies special status plant and wildlife species with potential to occur in the vicinity of the project area, as documented by lists compiled from various sources. Based on those lists, surveys were conducted of the habitat in the project area and consultation with other biologists were completed to identify specific species and habitats potentially impacted by the project alternatives. Many of the species identified through these sources have the potential to occur within the greater regional area but are not present within the project area due to the lack of suitable habitat. A comprehensive list of special status species is provided in Tables 3.9-1 and 3.9-2.

Plants

A list of special status plant species, shown in Table 3.9-1, contains 42 species that have the potential to occur in the East Span Project area. This list was compiled based

on the list of species provided by U.S. Fish and Wildlife Service (USFWS), literature review, a review of the California Natural Diversity Database (CNDDB), and California Native Plant Society's (CNPS's) Inventory database. The CNPS is an independent organization that reviews and maintains information on rare native plants in California. In an effort to categorize degrees of concern for rare plants, the CNPS developed five lists which indicate rarity and endangered plants. The first two categories, List 1B and List 2, meet CEQA criteria for plants listed as rare, threatened, or endangered. Included in this list is a CNPS List 4 category which includes plants of limited distribution and are considered significant species locally.

Surveys for plants were conducted in Fall 1997 and Spring 1998 to assess the known and potential occurrence of threatened and endangered species. Survey dates were selected to optimize the likelihood of observing target species during their blooming period. Several plant species have the potential to occur due to presence of marginal supporting habitat. The results of the surveys indicate that only the marsh gumplant occurs in the project area. A brief description of the marsh gumplant is provided below.

Marsh Gumplant. Marsh gumplant is included on List 4 of the CNPS Inventory. It has no federal or state status. This species was observed during botanical surveys on the northern portion of the YBI and the Oakland Touchdown. The marsh gumplant may provide nesting habitat for the Alameda song sparrow.

Wildlife

A list of special status species, shown in Table 3.9-2, contains 70 species that have the potential to occur in the vicinity of the East Span Project area. These species were compiled based on the list of species provided by the USFWS and NMFS, a literature review, and a review of the CNDDB. Of the 70 special status wildlife species thought to occur in the vicinity of the project area, only 16 wildlife species have the potential to occur in the project area because suitable or marginally suitable supporting habitat is present.

Surveys for wildlife and aquatic species were not conducted for this project, given the availability of information from previous studies, including avian surveys, entomology field surveys, and reptile and amphibian surveys. A brief description of wildlife species known to occur in the project area is provided below.

Harbor Seal (*Phoca vitulina*). Harbor seals are protected from harassment under the Federal Marine Mammal Protection Act of 1972, as amended. Foraging sites are generally close to shore where medium-sized fish in addition to bivalves, crab, octopus, herring, and squid are taken as prey. Harbor seals use the south side of YBI as a haul-out site year-round. This site is located approximately 305 meters (1,000 feet) from the nearest construction limit boundary.

American Peregrine Falcon (*Falco peregrinus anatum*). Two pairs of peregrine falcon nest and roost on the SFOBB. One pair nests on the West Span and one pair on the East Span. Courtship behavior and other nesting activities can begin

as early as December for these pairs. Eggs are usually laid in early March, and the young generally fledge in the third week of May.

Saltmarsh Common Yellowthroat (*Geothlypis trichas sinuosa*). The saltmarsh common yellowthroat inhabits fresh and brackish wetland areas as well as upland habitat throughout the San Francisco Bay Area. Saltmarsh common yellowthroats use the Emeryville Cresent as wintering habitat. Observations of three individuals perched on gumplant (*Grindelia sp.*), located adjacent to the SFOBB Toll Plaza, were made in December 1989 by Caltrans environmental staff.

Alameda Song Sparrow (*Melospiza melodia pusillula*). The Alameda song sparrow prefers fresh, brackish and salt marsh habitats. Alameda song sparrow occurs in coastal salt marsh habitat at the Emeryville Crescent, adjacent to the SFOBB Toll Plaza. There have been no observations of the Alameda song sparrow nesting in the project area; however, marsh gumplant, which occurs on the north side of the Oakland Touchdown and the YBI, may provide nesting habitat for the Alameda song sparrow. The Alameda song sparrow has been observed perching on individual gumplants within the project area.

Double-crested Cormorant (*Phalacrocorax auritus*). This species breeds in dense colonies that can be found on rocky coasts and offshore islands, as well as on inland lakes, and rivers. Cormorants have the ability to nest at any time during the breeding season if the first nesting attempt is unsuccessful. Therefore, nests may be active any time between March and September. Double-crested cormorants have been known to nest on the East Span of the SFOBB since 1984. The colony of double-crested cormorants includes 400 to 600 nesting pairs. Higher concentrations of nesting pairs occur between Piers E5 and E15.

California Brown Pelican (*Pelecanus occidentalis californicus*). The California brown pelican is known to rest on bridge footings and forage within the project area. No known nest sites occur in the project area. Activity near the bridge structure during any of the proposed project actions would discourage pelicans from resting or foraging near the existing bridge.

Western Gull (*Larus occidentalis*). The western gull is protected under the Migratory Bird Treaty Act. Western gulls nest on the pier footings of the SFOBB West Span and have the potential to nest on the footings of the East Span.[30]

California Clapper Rail (*Rallus longistostris obsoletus*). The California clapper rail is a year-round resident of coastal salt marshes. Individuals hide their nests among a canopy of wetland vegetation dominated by pickleweed and cordgrass. They feed during low tides when invertebrates and seeds are most easily obtained. Clapper rails are most commonly found in the South Bay and Suisun marsh areas of San Francisco Bay. This species is known to occur in the Emeryville Crescent area, located outside of the study area.

[30] Caltrans, Letter from a Caltrans District 4 biologist regarding Western Gulls, July 1998.

California Least Tern (*Sterna antillarum browni*). The California least tern nests in colonies on bare or sparsely vegetated areas near the coast. This species is found in the San Francisco Bay Area during the breeding season from May through August. The closest known nesting sites are located on the Oakland Army Base and at the Alameda Naval Air Station. Nesting habitat which supports the California least tern is not located within the study area.

Shorebirds. Shorebirds are protected under the Migratory Bird Treaty Act. Shorebirds that are known to occur in the project area include western sandpiper (*Calidris mauri*) and black-bellied plover (*Pluvialis squatarola*). A strip of Oakland Army Base property located on the south side of the Oakland Touchdown is known to provide upland resting habitat for large concentrations of shorebirds during high tides. As a result of development around the Central Bay, limited upland resting areas remain available for shorebird use during the winter season.

Central Valley and Central California-Coast Steelhead (*Oncorhynchus mykiss*). Steelhead, the anadromous form of rainbow trout, inhabit the Sacramento, Stanislaus, Tuolumne, and Merced Rivers and the mainstem of the San Joaquin River. The life history of steelhead is similar to that of chinook salmon, with two major differences. First, steelhead do not necessarily die after spawning, thus maintaining their ability to return to the Pacific Ocean after spawning in freshwater. Second, juvenile steelhead may spend up to four years rearing in freshwater prior to emigrating to the ocean as smolts. Typically, Sacramento steelhead emigrate as age 1 fish (one year in fresh water) through San Francisco Bay and the Sacramento-San Joaquin Estuary from November through May.

Steelhead populations in the Central California Coast ESU (Evolutionary Significant Unit) have been listed by the NMFS as threatened under the Federal Endangered Species Act (62 No. 159) and are proposed as endangered in the California Central Valley ESU. Steelhead migration periods are similar to the winter-run chinook salmon which inhabit shallow water habitat during foraging.

Winter-run, Fall-run, Spring-run Chinook Salmon (*Oncorhynchus tshawytscha*). Chinook salmon are anadromous, spending three to five years at sea before returning to freshwater to spawn. San Francisco Bay serves as a conduit through which all adult salmon must pass to reach their upstream spawning grounds. Additionally, juvenile "smolt" salmon utilize the Bay as a migration corridor to reach the Pacific Ocean. Smoltification is the physiological acclimation of juvenile salmon to full-strength sea water which occurs after completion of the freshwater rearing phase. The chinook salmon population in San Francisco Bay and the Sacramento-San Joaquin Estuary is comprised of four races: fall-run, late fall-run, spring-run and winter-run. Each of these spawning populations is separated based on the timing of adult upstream migration, spawning, and juvenile downstream migration. The winter-run is federally listed as endangered, the spring-run is listed as federally proposed endangered, and the fall-run is listed as proposed threatened.

The federal and state endangered winter-run chinook salmon migrate as adults through San Francisco Bay and the Sacramento-San Joaquin River Estuary from December

through April. Spawning is confined to the mainstream Sacramento River and occurs from mid-April through mid-July, peaking in May and June. Winter-run fry emerge from the gravel from July through October and rear to smoltification in the Sacramento River upstream from the Delta. However, in years of high Delta outflow, fry may emigrate to the estuary. Generally, the period of peak outmigration through San Francisco Bay and the Sacramento-San Joaquin Estuary is between January and April. The area of designated winter-run critical habitat includes all of San Francisco Bay north of the SFOBB.

The spring-run chinook salmon enters the Sacramento River from March to July and spawns from late August through early October, with a peak in September. The fall-run chinook salmon enters the Sacramento and San Joaquin Rivers from July through April and spawns from October through February. Both runs exhibit an ocean-type life history, emigrating as fry, subyearlings, and yearlings. Winter-run, spring-run, and fall-run chinook salmon have the potential to occur in the study area.

Green Sturgeon (*Acipenser medirostris*) and Longfin Smelt (*Sprinchus thaleichtys*). Habitat for the green sturgeon and longfin smelt does not occur in the project study area; however, it has the potential to occur during years of high amounts of rain.

Pacific Herring (*Clupea harengeus*). Pacific herring is a small schooling marine fish which enters estuaries and bays to spawn. Pacific herring spawn from late October through March. This species spawns in both subtidal and intertidal habitat. In San Francisco Bay, about 50 to 70 percent of spawning occurs in the subtidal zone.

The project area contains both historic and current spawning habitat. Pacific herring utilize eelgrass for spawning substrate, but due to the paucity of eelgrass in San Francisco Bay, other marine vegetation (seaweeds), pilings, and rocks are also used for egg attachment. Herring may spawn on sandy substrates, but in San Francisco Bay, herring have not been observed to spawn on mudflats lacking vegetation. After spawning, Pacific herring return to their ocean feeding grounds. After hatching, larval herring generally remain in the estuary or bay in which they were spawned, before migrating to the ocean in the fall.

Early life stages of herring development are sensitive to environmental and human-induced stress, including non-suitable levels of water temperature, salinity, dissolved oxygen concentrations, suspended sediments, and toxic contaminants. Eelgrass beds suitable for herring spawning occur within the project study area.

Table 3.9-1 Special Status Plant Species Potentially Occurring in the Vicinity of the SFOBB East Span Seismic Safety Project (Page 1 of 5)

Species and Common Name	Status			Flowering Period	Potential for Occurrence[e]
	Federal[a]	State[b]	CNPS[c] R-E-D[d]		
Arabis blepharophylla coast rock cress	--	--	4 1-1-3	Feb.-April	Not present; no supporting habitat
Arctostaphylos hookeri ssp. *ravenii* Presidio manzanita	E	E	1B 3-3-3	Feb.-March	Not present; no supporting habitat
Arctostaphylos hookeri ssp. *franciscana* San Francisco manzanita	SC		1A none	Feb.-April	Not present; no supporting habitat
Arctostaphylos pallida Pallid manzanita	PT	E	1B 3-3-3	Dec.-March	Not present; no supporting habitat
Arctostaphylos tomentosa ssp. *rosei* shaggy-barked manzanita	--	--	Proposed listing	Dec.-March	Not present; no supporting habitat
Arenaria paludicola marsh sandwort	E	E	1B 3-3-2	May-August	Not present; no supporting habitat
Astragalus tener var. *tener* Alkali milk-vetch	--	--	1B 3-2-3	March-June	Not present; no supporting habitat
Carex comosa bristly sedge	--	--	2 3-3-1	May-Sep.	Not present; no supporting habitat
Chorizanthe cuspidata var. *cuspidata* San Francisco Bay spineflower	SC	--	1B 2-2-3	April-July	Unlikely; not observed during surveys
Chorizanthe robusta var. *robusta* robust spineflower	E	--	1B 3-3-3	May-Sep.	Unlikely; not observed during surveys
Cirsium occidentale var. *compactum* compact cobweb thistle	SC	--	1B 2-2-3	April-June	Not present; no supporting habitat

Table 3.9-1 Continued (Page 2 of 5)

Species and Common Name	Status			Flowering Period	Potential for Occurrence[e]
	Federal[a]	State[b]	CNPS[c] R-E-D[d]		
Collinsia corymbosa round-headed Chinese houses	--	--	1B 2-2-3	April-June	Not present; no supporting habitat
Clarkia franciscana Presidio clarkia	E	E	1B 3-3-3	May-July	Not present; no supporting habitat
Collinsia multicolor San Francisco collinsia	--	--	4 1-1-3	March-May	Not present; marginal habitat present
Cordylanthus maritimus ssp. *palustris* Pt. Reyes bird's beak	SC	--	1B 2-2-3	April-May	Unlikely; not observed during surveys
Erysimum franciscanum San Francisco wallflower	SC	--	4 1-2-3	March-June	Not present; no supporting habitat
Fritillaria lilacea fragrant fritillary	SC	--	1B 1-2-3	Feb.-April	Not present; no supporting habitat
Gilia capitata ssp. *chamissonis* dune gilia	--	--	Proposed listing	May-July	Unlikely; not observed during surveys
Gilia millefoliata many-stemmed gilia	--	--	Proposed listing	April-June	Not present; marginal habitat present
Grindelia hirsutula var. *maritima* San Francisco gumplant	SC	--	1B 2-2-3	Aug.-Sep.	Unlikely; not observed during surveys
Grindelia stricta var. *angustifolia* marsh gumplant	--	--	4 1-1-3	Aug.-Oct.	Present
Helianthella castanea Diablo rose-rock	SC	--	1B 3-2-3	April-June	Not present; no supporting habitat

Table 3.9-1 Continued (Page 3 of 5)

Species and Common Name	Status			Flowering Period	Potential for Occurrence[e]
	Federal[a]	State[b]	CNPS[c] R-E-D[d]		
Hesperolinon congestum Marin dwarf-flax	T	T	1B 3-3-3	May-July	Not present; no supporting habitat
Holocarpha macradenia Santa Cruz tarplant	SC	E	1B 2-3-3	June-Oct.	Unlikely; not observed during surveys
Horkelia cuneata ssp. *sericea* Kellogg's horkelia	SC		1B 3-3-3	April-Sep.	Unlikely; not observed during surveys
Lasthenia conjugens Contra Costa goldfields	E	--	1B 3-3-3	March-June	Not present; no supporting habitat
Layia carnosa beach layia	E	E	1B 3-3-3	May-July	Not present; no supporting habitat
Lessingia germanorum San Francisco lessingia	E	E	1B 3-3-3	Aug.-Nov.	Unlikely; not observed during surveys
Lilium maritimum coast lily	SC	--	1B 2-3-3	May-July	Not present; no supporting habitat
Linanthus grandiflorus large-flowered linanthus	--	--	4 1-2-3	April-July	Not present; no supporting habitat
Microseris paludosa marsh microseris	--	--	Proposed listing	May-June	Not present; marginal habitat present
Monardella undulata curly-leaved monardella	--	--	4 1-2-3	May-July	Unlikely; not observed during surveys
Piperia michaelii Michael's rein orchid	--	--	4 1-2-3	May-Aug.	Not present; marginal habitat present

Table 3.9-1 Continued (Page 4 of 5)

Species and Common Name	Status			Flowering Period	Potential for Occurrence[e]
	Federal[a]	State[b]	CNPS[c] R-E-D[d]		
Plagiobothrys chorisianus var. *chorisianus* Choris's popcorn flower	--	--	3 2-2-3	April-June	Not present; no supporting habitat
Plagiobothrys diffusus San Francisco popcornflower	SC	E	1B 3-3-3	April-June	Not present; no supporting habitat
Sanicula maritima adobe sanicle	SC	SC	1B 3-3-3	April-May	Not present; no supporting habitat
Sidalcea hickmanii ssp. *viridis* Marin checkermallow	SC	--	1B 3-1-3	May-June	Not present; no supporting habitat
Sidalcea malvaeflora ssp. *purpurea* checkermallow	--	--	Proposed listing	Feb.-June	Not present; no supporting habitat
Silene verecunda ssp. *verecunda* Mission Dolores campion	SC	--	1B 3-2-3	March-June	Unlikely; not observed during surveys
Streptanthus albidus ssp. *peramoenus* Most beautiful (uncommon) jewelflower	SC	--	1B 2-2-3	April - June	Not present; no supporting habitat
Suaeda californica California suaeda	E	--	1B 3-3-3	July-Oct.	Unlikely; not observed during surveys
Triphysaria floribunda San Francisco owl's-clover	SC	--	1B 2-2-3	April-May	Not present; no supporting habitat

Table 3.9-1 Continued (Page 5 of 5)

Abbreviations:

[a] Federal

E - Listed as endangered under the Federal Endangered Species Act.
T - Listed as threatened under the Federal Endangered Species Act.
PE - Proposed as endangered under the Federal Endangered Species Act.
PT - Proposed as threatened under the Federal Endangered Species Act.
SC - Federal species of concern; U.S. Fish and Wildlife Service (USFWS) lacks sufficient information to support a listing proposal.
C - Candidate species; USFWS has on file enough information to propose listing as endangered or threatened.

[b] State

E - Listed as endangered under the California Endangered Species Act.
T - Listed as threatened under the California Endangered Species Act.
PE - Proposed as endangered under the California Endangered Species Act.
PT - Proposed as threatened under the California Endangered Species Act.
SC - California species of special concern.

[c] California Native Plant Inventory Status (CNPS)

List 1B - Plants that are rare, threatened, or endangered in California and elsewhere.
List 2 - Plants that are rare, threatened, or endangered in California, but more common elsewhere.
List 3 - Plants about which more information is needed in order to assign them to another list or to reject them from being listed.
List 4 - Plants that are of limited distribution in California.

[d] R-E-D Code

This code is divided into three classes or degrees of concern, represented by the number 1, 2, or 3 (higher numbers indicate greater concern):

rarity - addresses the extent of the plant's distribution and number of individuals.
endangerment - addresses the plant's vulnerability to extinction.
distribution - addresses overall range of the plant.

[e] Potential for Occurrence

Unlikely; not observed during surveys - suitable habitat for this species was identified in the project area; however, no observations were made during 1997 fall and 1998 spring surveys.
Present - plants of this species were found during surveys or are known to be present in the project area from literature reviews.
Not present; no supporting habitat - habitat that would support the presence of this species is not present in the project area.
Not present; marginal habitat present - marginal habitat that could support this species was found in the project area.

Table 3.9-2 Special Status Wildlife Species, Critical Habitat, and Economically Important Fish Potentially Occurring in the Vicinity of the SFOBB East Span Seismic Safety Project (Page 1 of 9)

Species and Common Name	Status		Potential for Occurrence[c]
	Federal[a]	State[b]	
MAMMALS			
Eumetopias jubatus Steller sea lion	T	--	Unlikely to occur; no known occurrences in vicinity of project area
Phoca vitulina Harbor seal	Protection under Federal Marine Mammal Protection Act	--	Present; haul-out site located 305 meters (1,000 feet) from nearest temporary construction limit
Eumops perotis californicus Greater western mastiff-bat	SC	SC	Not present; no supporting habitat
Myotis evotis Long-eared myotis bat	SC	SC	Not present; no supporting habitat
Myotis thysanodes Fringed myotis bat	SC	SC	Not present; no supporting habitat
Myotis volans Long-legged myotis bat	SC	SC	Not present; no supporting habitat
Myotis yumanensis Yuma myotis bat	SC	SC	Not present; no supporting habitat
Neotoma fuscipes annectens San Francisco dusky-footed woodrat	SC	SC	Not present; no supporting habitat

Table 3.9-2 Continued (Page 2 of 9)

Species and Common Name	Status		Potential for Occurrence[c]
	Federal[a]	State[b]	
Neotoma fuscipes riparia San Joaquin Valley woodrat	C	SC	Not present; no supporting habitat
Perognathus inornatus inornatus San Joaquin pocket mouse	SC	SC	Not present; no supporting habitat
Plecotus townsendii townsendii Pacific western big-eared bat	SC	SC	Not present; no supporting habitat
Reithrodontomys raviventris Salt marsh harvest mouse	E	E	Not present; no supporting habitat
Scapanus latimanus parvus Alameda Island mole	SC	SC	Not present; no supporting habitat
Sorex vagrans halicoetes Salt marsh vagrant shrew	SC	SC	Not present; no supporting habitat
BIRDS			
Agelaius tricolor Tricolored blackbird	SC	SC	Not present; no supporting habitat
Amphispiza belli belli Bell's sage sparrow	SC	SC	Not present; no supporting habitat
Aquila chrysaetos Golden eagle	--	SC	Not present; no supporting habitat

Table 3.9-2 Continued (Page 3 of 9)

Species and Common Name	Status		Potential for Occurrence[c]
	Federal[a]	State[b]	
Athene cunicularia Burrowing owl	--	SC	Not present; no supporting habitat
Buteo regalis Ferruginous hawk	SC	SC	Not present; no supporting habitat
Charadrius alexandrinus nivosus Western snowy plover	T	SC	Unlikely to occur; feeding habitat along Oakland Touchdown
Empidonax traillii brewster Little willow flycatcher	SC	--	Not present; no supporting habitat
Falco peregrinus anatum American peregrine falcon	E	E	Present; nests between upper and lower bridge deck on Pier E2
Geothlypis trichas sinuosa Saltmarsh common yellow throat	SC	SC	Potential to occur; nesting habitat within the Emeryville Crescent, outside of the project area on Oakland side
Haliaeetus leucocephalus Bald eagle	T	E	Not present; no supporting habitat
Larus occidentalis western gull	MBTA	--	Present; nesting occurs on the pier footings of the existing bridge.
Laterallus jamaicensis black rail	SC	T	Unlikely to occur; supporting habitat present in Emeryville Crescent, adjacent to project area on Oakland side. Species not detected in project area during surveys

Table 3.9-2 Continued (Page 4 of 9)

***Species* and Common Name**	**Status**		**Potential for Occurrence[c]**
	Federal[a]	**State[b]**	
Melospiza melodia pusillula Alameda song sparrow	SC	--	Potential to occur; nesting habitat within the Emeryville Crescent, outside of the project area on Oakland side
Pelecanus occidentalis californicus California brown pelican	E	E	Present (Seasonally) at Coast Guard Station and on bents
Phalacrocorax auritus Double-crested cormorant	--	SC	Present; nests on bridge below lower deck
Rallus longirostris obsoletus California clapper rail	E	E	Potential to occur; nesting habitat within the Emeryville Crescent, outside of the project area on Oakland side
Sterna antillarum browni California least tern	E	E	Potential to occur; observed feeding in waters outside of the project area
REPTILES			
Caretta caretta Loggerhead turtle	T	--	Unlikely to occur; no known occurrences in project area
Chelonia mydas Green sea turtle	T	--	Unlikely to occur; no known occurrences in project area
Clemmys marmorata marmorata Northwestern pond turtle	SC	--	Not present; no supporting habitat
Clemmys marmorata pallida Southwestern pond turtle	SC	--	Not present; no supporting habitat

Table 3.9-2 Continued (Page 5 of 9)

Species and Common Name	Status		Potential for Occurrence[c]
	Federal[a]	State[b]	
Dermochelys coriacea Leatherback turtle	E	--	Unlikely to occur; no known occurrences in project area
Lepidochelys olivacea Olive ridley sea turtle	T	--	Unlikely to occur; no known occurrences in project area.
Masticophis lateralis euryxanthus Alameda whipsnake	T	T	Not present; no supporting habitat
Phynosoma coronatum frontale California horned lizard	SC	SC	Not present; no supporting habitat
AMPHIBIANS			
Ambystoma californiense California tiger salamander	C	SC	Not present; no supporting habitat
Rana boylii Foothill yellow-legged frog	SC	--	Not present; no supporting habitat
Scaphiopus hammondii Western spadefoot toad	SC	--	Not present; no supporting habitat
Rana aurora draytonii California red-legged frog	T	SC	Not present; no supporting habitat
FISH			
Acipenser medirostris Green sturgeon	SC	SC	Present; supporting habitat outside of project area. Likely to occur during high water levels.

Table 3.9-2 Continued (Page 6 of 9)

***Species* and Common Name**	**Status**		**Potential for Occurrence[c]**
	Federal[a]	**State[b]**	
**Clupea harengeus* Pacific herring	--	--	Present; eelgrass spawning habitat in project area
Eucyclogobius newberryi Tidewater goby	E	SC	Unlikely to occur; spawning habitat not in project area
Hypomesus transpacificus Delta smelt	T	T	Unlikely to occur; spawning habitat not in project area
Lampetra ayresi Pacific lamprey	SC	--	Not present; no supporting habitat.
Lampetra ayresi River lamprey	SC	SC	Unlikely to occur; supporting habitat not in project area
Oncorhynchus mykiss Central California-coast steelhead ESU	T	SC	Present; shallow water foraging habitat in project area
Oncorhynchus mykiss Central-valley steelhead ESU	PE	SC	Present; shallow water foraging habitat in project area
Oncorhynchus tshawytscha Winter-run chinook salmon	E	E	Present; supporting habitat in project area
Oncorhynchus tshawytscha Winter-run chinook salmon critical habitat	Present	--	The existing East Span of the SFOBB is considered the southern boundary of the critical habitat for the winter-run chinook

Table 3.9-2 Continued (Page 7 of 9)

Species and Common Name	Status		Potential for Occurrence[c]
	Federal[a]	State[b]	
Oncorhynchus tshawytscha Fall-run chinook salmon critical habitat	Proposed	--	The existing East Span of the SFOBB could be designated as southern boundary of critical habitat for fall-run chinook salmon
Oncorhynchus tshawytscha Spring-run chinook salmon	PE	SC	Present; supporting habitat located within project area
Oncorhynchus tshawytscha Spring-run chinook salmon critical habitat	Proposed	--	The existing East Span of the SFOBB could be designated as southern boundary of critical habitat for spring-run chinook salmon
Pogonichthys macrolepidotus Sacramento splittail	PT	SC	Unlikely to occur; supporting habitat not in project area
Sprinchus thaleichtys Longfin smelt	SC	SC	Present; likely to occur only during high water levels
INVERTEBRATES			
Adela oplerella Opler's longhorn moth	SC	--	Not present; no supporting habitat
Brachinecta lynchi Vernal pool fairy shrimp	T	--	Not present; no supporting habitat
Cicindela hirticollis gravida Sandy beach tiger beetle	SC	--	Not present; no supporting habitat
Euphydryas editha bayensis Bay checkerspot butterfly	T	--	Not present; no supporting habitat

Table 3.9-2 Continued (Page 8 of 9)

***Species* and Common Name**	**Status**		**Potential for Occurrence[c]**
	Federal[a]	**State[b]**	
Oncorhynchus tshawytscha Fall-run chinook salmon	PT	SC	Present; supporting habitat in project area
Icaricia icarioides missionensis Mission blue butterfly	E	--	Unlikely to occur; marginally supporting habitat in project area. Species not observed during surveys.
Incisalia mossii bayensis San Bruno elfin butterfly	E	--	Not present; no supporting habitat
Nothochrysa californica San Francisco lacewig	SC	--	Not present; no supporting habitat
Coelus globosus Globose dune beetle	SC	--	Not present; no supporting habitat
Hydrochara rickseckeri Ricksecker's water scavenger beetle	SC	--	Not present; no supporting habitat
Lichnanthe ursina Bumblebee scarab beetle	SC	--	Not present; no supporting habitat
Speyeria callippe callippe Callippe silverspot butterfly	E	--	Not present; no supporting habitat

Source: Natural Environmental Study, August 1998

* The Pacific herring is a commercial fish and is considered in this document because its population in the San Francisco Bay is monitored and a concern of the California Department of Fish and Game.

Table 3.9-2 Continued (Page 9 of 9)

Abbreviations:

[a] Federal

E - Listed as endangered under the Federal Endangered Species Act.
T - Listed as threatened under the Federal Endangered Species Act.
PE - Proposed as endangered under the Federal Endangered Species Act.
PT - Proposed as threatened under the Federal Endangered Species Act.
SC - Federal species of concern; USFWS lacks sufficient information to support a listing proposal.
C - Candidate species for which the USFWS has on file enough information to propose listing as endangered or threatened.
MBTA - These species are protected under the Migratory Bird Treaty Act.

[b] State

E - Listed as endangered under the California Endangered Species Act.
T - Listed as threatened under the California Endangered Species Act.
PE - Proposed as endangered under the California Endangered Species Act.
PT - Proposed as threatened under the California Endangered Species Act.
SCE - California candidate species for listing as endangered.

[c] Potential for Occurrence

Unlikely to occur - suitable habitat for this species was identified in the project area. However, the species is unlikely to occur due to its general avoidance of disturbed areas, lack of historic or recent occurrences near the project area, or the presence of only marginally suitable habitat.
Present - individuals of this species were found during surveys or are known to be found in the project area from literature reviews.
Not present; no supporting habitat - habitat that would support the presence of this species is not present in the project area.

3.10 HISTORIC AND CULTURAL RESOURCES

3.10.1 Regulatory Context

A cultural resources investigation was conducted in accordance with Section 106 of the National Historic Preservation Act and implementing regulations (36 CFR 800) to document the findings summarized below. On February 18, 1998, Caltrans, in conjunction with the FHWA, established an Area of Potential Effects (APE) wide enough to include all project alternatives, design options, and potential construction easements. The area was surveyed to identify cultural resources including archaeological and historic sites or properties. Accordingly, an Archaeological Survey Report (ASR), Historic Architecture Survey Report (HASR), Historic Properties Survey Report (HPSR), and Finding of Effects Report were prepared for review by the State Historic Preservation Officer (SHPO).

Cultural resources investigations for the East Span Project build on previous research conducted in 1997 by the U.S. Navy for the Naval Station Treasure Island Disposal and Reuse Project and prior Caltrans investigations for seismic retrofit work on the existing SFOBB published in 1997. These investigations and research for the East Span Project have resulted in the identification of cultural resources that are either listed on or determined eligible for listing on the National Register of Historic Places (NRHP). The SHPO has concurred with the findings of these previous investigations and with the eligibility evaluations prepared for the East Span Project.

The evaluation of NRHP eligibility is made by applying the Criteria of Evaluation codified in 36 CFR 60.4 as follows:

- The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and that

  a. Are associated with events that have made a significant contribution to the broad patterns of our history; or

  b. Are associated with the lives of persons significant in our past; or

  c. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant distinguishable entity whose components may lack individual distinction; or

  d. Have yielded or may be likely to yield information important in history or prehistory.

The results of archaeological and historic architectural investigations are presented in the following sections.

3.10.2 Archaeological Resources

The presence of one archaeological site, CA-SFr-04/H, which has both a prehistoric and historic component, has been recorded within the APE. The prehistoric component of this site is a contributing element to the potential eligibility of the site under Criterion D. Native American burials were reported to have been removed from this site by the University of California in 1934. Since CA-SFr-04/H has contained and may again yield human remains, its potential significance may extend beyond Criterion D.

The historic component of CA-SFr-04/H, related to the Naval Training Station, was determined to be a non-contributing element for potential eligibility to the National Register. Archival research does indicate, however, that there is a potential for eligible historical archaeological resources within the APE which are related to the American Period and associated with the presence of the Army Post and Depot and civilian occupation. Further historical archaeological research will be necessary to gather additional information related to the possible preservation of American Period resources, both on land and on the bay bottom within the footprint of the SFOBB East Span alternatives, and to determine eligibility. The State Historic Preservation Officer concurred with these findings on August 13 and 21, 1998. See Appendix G for SHPO views on eligibility.

The APE was occupied in prehistoric times by members of the *Huchiun* tribelet of the Ohlone (Costanoan) group. A list of interested Native Americans was provided by the Native American Heritage Commission prior to a field test of CA-SFr-04/H in March 1998. This test confirmed the integrity of the prehistoric component and established the vertical and horizontal boundaries of the deposit. All parties on the list were contacted in order to solicit their views regarding the field test. A Native American monitor was on site during archaeological field test investigations. Coordination will continue with interested Native Americans.

No historic or prehistoric resources were identified within the Oakland Touchdown area of the APE and this area is considered to possess no archaeological sensitivity. Refer to Appendix G for the views of the SHPO on archaeological resources (letters dated August 13 and 21, 1998.)

3.10.3 Historic Architectural Resources

Archival research and field investigations were conducted for the East Span Project and documented in a Historic Architecture Survey Report (Caltrans, April 1998). Previous investigations in 1983, 1991, and 1996 were also reviewed. Based on these investigations, NRHP-listed and NRHP-eligible resources have been identified within the APE as defined for the build alternatives. Listed and eligible resources are described below and identified on Figures 3-21 and 3-22 in Appendix A.

San Francisco-Oakland Bay Bridge (SFOBB)

The SFOBB, completed in 1937, is a double-deck structure carrying five lanes of traffic on each level. (See Section 1.3.1 and Figure 1-1 in Appendix A for a description of the

SFOBB.) The Bay Bridge is eligible for the NRHP under Criteria A, B, and C for its role in shaping Bay Area transportation patterns, its association with important engineers and architects, and as a significant accomplishment in civil engineering. The National Register property includes entrance and exit ramps connected to the west approach, and the elevated bus ramps that connect the west approach to the Transbay Transit Terminal at Mission Street between First and Fremont Streets. Twin-towered suspension spans extend from San Francisco to YBI and are connected by a massive center anchorage. On YBI, there are concrete viaducts at either end of a double-deck tunnel. Continuing eastward from the island, a series of steel truss spans carry the highway across the eastern portion of the Bay.

The lower deck of the bridge originally carried two tracks for electric streetcars in addition to three lanes for trucks, while the upper deck carried five lanes for automobiles. Rail service was terminated in 1958, and the bridge was altered to its present configuration of five traffic lanes on each level. Substantial alterations were also made to the YBI Tunnel and its approaches at that time. The other major alteration of the structure occurred on the west approach ramps in San Francisco, with the construction of the freeway system in the late 1950s. This work altered much of the upper deck approach ramp between First and Fifth Streets. Maintenance work over the years and repairs made after earthquakes have resulted in other changes to the structure, but the bridge as a whole retains sufficient integrity to be eligible for NRHP listing.

Four buildings associated with the SFOBB and included in the eligibility determination of the entire bridge are located within the project APE.

Caltrans Garage (YBI). The Caltrans garage, located on YBI adjacent to the SFOBB, was constructed in the late 1930s as an integral component to the SFOBB. The building, constructed of reinforced concrete, is included in the eligibility determination of the entire bridge (see Figure 3-23 in Appendix A).

Caltrans Electrical Substation (YBI) - This reinforced concrete structure, located on YBI adjacent to the SFOBB, was constructed in the 1930s as an integral component to the SFOBB (see Figure 3-23 in Appendix A). It is included in the eligibility determination of the entire bridge.

Caltrans Electrical Substation (Oakland Touchdown Area). This reinforced concrete structure, located at the Oakland Touchdown area adjacent to the SFOBB, was constructed in the late 1930s as an integral component to the SFOBB (see Figure 3-24 in Appendix A). It is included in the eligibility determination of the bridge.

Key Pier Substation. This reinforced concrete structure, located at the Oakland Touchdown area adjacent to the SFOBB, was constructed in 1926 (see Figure 3-24 in Appendix A). It was not built as a component of the Bay Bridge; however, it was incorporated into the bridge operation to supply power for the trains crossing the bridge. It is a contributing component of the Bay Bridge and is also individually eligible for the NRHP under Criterion A for the reason that it is historically significant as a rare surviving remnant of the Key System railroad.

Senior Officers' Quarters Historic District (includes Quarters 1 to 7 and Buildings 83, 205, and 230)

The Senior Officers' Quarters Historic District (the district) includes seven residences, all of wood-frame construction, with two full floors and a dormered attic (see Figure 3-25 in Appendix A). They were constructed between 1900 and 1903 in the Classical Revival Style. Buildings 83 and 230 are garages with second floor living quarters, constructed in 1918 and 1944, respectively. Building 205 is a single-story garage constructed in 1935. Other non-architectural elements of the district include the landscaping behind the residences, the formal gardens between Quarters 1 and Building 230, and the lawn to the east of Quarters 1 that slopes down to a retaining wall at the edge of the former parade grounds. The district is eligible for the NRHP under Criteria A and C, in the areas of military history and architecture.

The district was originally identified in an historic architecture survey of Yerba Buena and Treasure Islands, carried out for the Navy in 1997. The boundary of the district in the vicinity of the Bay Bridge is not clear, due to discrepancies between the written description and the map included in the survey report. The map appears to show the drip line of the bridge as the southeast boundary of the district, while the written description does not mention the bridge or the landscape features (two triangular planter boxes and a concrete stairway) located directly under the bridge. As part of its compliance with Section 106, FHWA intends to seek clarification of the district boundary in consultation with the SHPO and the Navy. FHWA will make recommendation to the SHPO as to the most appropriate boundary for the historic district, based on historical research and consideration of the integrity of the landscape features in the area. The SHPO must concur in any revisions to the boundaries of the district.

Quarters 1. The largest and most elaborate of the seven residences within the historic district, was listed on the NRHP in 1991. It is individually listed in NRHP under Criteria A and C (see Figure 3-25 in Appendix A).

Quarters 8. Naval Quarters 8 is a three-story residence of Mediterranean design, built of wood with a stucco exterior on the first two floors (see Figure 3-26 in Appendix A). It was constructed in 1905 as the home of the commander of the Marine Corps detachment assigned to YBI. The property is eligible for the NRHP under Criteria A and C, in the areas of military history and architecture. The house is historically significant as one of the few extant buildings from the early 20th century associated with the Naval Station on YBI and the last remaining building associated with the Marine Corps presence on the island. It is also architecturally significant as the work of prominent San Francisco architects James and Merritt Reid.

Quarters 9. Naval Quarters 9 is a 1-1/2-story residence of wood-frame construction (see Figure 3-27 in Appendix A). The property is eligible for the NRHP under Criteria A and C, in the areas of military history and architecture. It was built ca. 1916 as the residence for the civilian "master of tugs" and is the only extant building on YBI constructed for a civilian employee of the Navy. It is also one of the few surviving

buildings on the island from the period of extensive growth of the Naval Station in the years before and during U.S. involvement in World War I.

Quarters 10. Naval Quarters 10 is a two-story, wood-frame residence constructed in 1948 (see Figure 3-28 in Appendix A). The property is eligible under NRHP Criterion C, for its architecture (Bay Area modernism). The historic property includes the garage, Building 267, which was constructed at the same time as the house and is included as a contributing component of the historic resource.

Building 262. Building 262, at the eastern tip of YBI, is a reinforced concrete building with a gable roof clad in corrugated metal (see Figure 3-29 in Appendix A). The property is eligible for the NRHP under Criteria A and C, in the areas of military history and architecture. It was constructed for the U.S. Army in 1891, for the manufacture and storage of mines to be used in coastal defenses. The building is historically significant as the only extant building associated with the 19th century Army presence on YBI. It is also significant architecturally, as a pioneering example of reinforced concrete construction, a building technique that was still in its infancy in 1891.

No other historic properties exist within the APE. There are no California Historical Landmarks, California Points of Historical Interest, or city-designated landmarks within the APE. NRHP historic districts exist in proximity to the East Span Project APE but would not be affected by the proposed action. The USCG historic district is located to the southeast and outside the APE on YBI and would not be affected by the project. The Oakland Army Base historic district is located to the east of the APE at the Oakland Touchdown area and would not be affected by the project.

Consultation was initiated with the State Historic Preservation Officer (SHPO) in June 1998, concerning eligibility of resources within the APE. The SHPO responded in a letter dated August 13, 1998 (see Appendix G: Agency Consultation Letters) and concurred with National Register eligibility for Quarters 10, Navy Building 267 (the garage for Quarters 10), the Bay Bridge Oakland Substation, and the Key Pier Substation. The SHPO had concerns abut the pre-1948 buildings that were considered ineligible in the HASR and requested information evidencing that FHWA solicited the comments of the Navy and USCG on the eligibility of these properties. Caltrans addressed this concern, and the SHPO responded in a letter dated August 21, 1998, concurring that the buildings are not eligible. (A copy of the August 21 letter can be found in Appendix G.)

SECTION 3.11 SCIENTIFIC RESOURCES

Paleontologic resources, typically vertebrate or invertebrate fossilized remains, are afforded federal protection under 40 CFR 1508.27 as a subset of scientific resources. California Public Resources Code Section 5097.5 provides for protection of paleontological sites and features on public lands. Paleontologic resources may exist within the project APE in sediments underlying San Francisco Bay. A mammoth tooth was discovered in the 1930s within Bay sediments during construction of the existing SFOBB East Span at Pier E11. California Public Resources Code Section 5097.5 mandates that "No person shall knowingly and willfully excavate upon, or remove, destroy, injure, or deface, any ...vertebrate paleontological site, including fossilized footprints...or any other paleontological...feature, situated on public lands, except with the express permission of the public agency having jurisdiction over the lands. Typically, the State Lands Commission is the designated public agency.

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

4.1 COMMUNITY IMPACTS

The East Span Project does not lie within the boundaries of any established residential neighborhoods. Land within the project is under institutional use. Project alternatives were analyzed for potential effects to local communities including effects on employment; community services; potential for displacement of residences, businesses, or public facilities; and consistency with existing land uses and development policies.

4.1.1 Social and Economic Impacts

Project alternatives were analyzed for potential social and economic impacts. Socioeconomic impacts are considered to occur if a project:

- Induces substantial growth in a community
- Places demands on community facilities
- Disrupts existing patterns of interaction in a neighborhood
- Affects a low-income or minority community

The East Span Project is not expected to have adverse social or economic impacts on established neighborhoods or communities given the project's location in an institutional and industrial setting and because project alternatives would replace an existing transportation facility with one of equal capacity. Any project-related changes to social or economic conditions in Bay Area neighborhoods or communities are expected to result from the employment effects of the large construction labor force that would be needed to construct the build alternatives.

Employment

Project build alternatives will generate demand for workers during the estimated three to five year construction period. Construction will generate direct construction jobs and spin-off service employment opportunities. Workers are expected to be recruited from the local labor force, with specialty skills being provided by workers from inside and outside the region.

The Bay Area has a large labor force and vibrant economy; thus, it is expected that the vast majority of the construction labor force would be workers already living in the area. However, some specific tasks, such as bridge iron workers, can only be done by a limited number of national contractors, resulting in a need to import specialist workers. In a worst-case scenario, in which there are many major construction projects occurring concurrently (compared to the base level), a shortfall of construction workers could develop in the region.

If a shortage developed, other workers would commute from outside the region (Central Valley) or take up temporary residence. Temporary construction workers often rent rooms or stay in motels during the work week, leaving their families behind. In addition to motels and rooms, there are more than 700,000 rental units within the Bay Area, so the potential impact of the project labor force would not be noticeable on the housing market. The Bay Area is a large and dynamic region. At any given time, some companies and agencies are reducing their labor force while others are increasing. There is a movement of workers and households in and out of the Bay Area at all times, and the demand generated by East Span build alternative construction activities would not cause an adverse impact on the general availability of labor supply, the housing market, or school enrollment.

Construction materials such as steel and concrete are not produced in the project vicinity and are likely to be purchased from other areas. Thus, the primary economic benefits of the project would be the direct construction jobs and the economic multiplier caused by local spending by the construction labor force. The Association of Bay Area Governments (ABAG) estimates that the number of local secondary jobs created is 1.44:1 construction job. Because the region has a large design and engineering labor force, this effect is likely to occur locally as well, providing additional labor jobs.

No-Build Alternative. The No-Build Alternative would not generate additional employment opportunities because no construction work beyond that completed under the prior Interim Retrofit Project would be undertaken.

Retrofit Existing Structure Alternative. Engineering design and construction of the Retrofit Existing Structure Alternative are expected to generate approximately 2,364 total person years of employment not otherwise predicted for the Bay Area economy (see Table 4.1-1). A forecast of construction workers required to retrofit the existing East Span, by trade, assumes: 60 iron workers, 60 pile drivers, 100 operating engineers, 60 carpenters, 40 concrete finishers, 40 laborers and miscellaneous workers.

Table 4.1-1 Potential Project Construction Employment Impacts of Build Alternatives

Alternative	Construction Cost ($000)	Construction Person Yrs.(1)	Engineering Design Cost ($000)	Design Person Yrs. (2)	Total Person Years
Retrofit Existing	$818,000	1,636	$91,000	728	2,364
N-2 alignment[3]	$1,476,000	2,952	$164,000	1,312	4,264
N-6 alignment[3]	$1,485,000	2,970	$165,000	1,320	4,290
S-4 alignment[3]	$1,475,000	2,952	$164,000	1,312	4,264

Sources: Caltrans and Parsons Brinckerhoff, September 1998.

Assumptions: (1) 19 % of construction cost=labor@$95,000/person year (includes overhead)
(2) 100% of design & engineering=labor@$125,000/person year
(3) High range of cost estimate for this alternative as presented in Table 2.4-1

Replacement Alternatives

A forecast of construction workers required to construct a replacement bridge was estimated based on average annual employment of 600 people over the estimated five-year construction period, which includes dismantling the existing bridge. (The number of employees required will increase if the construction period is shortened.) Estimated direct labor by trade is: 102 iron workers, 100 pile drivers, 168 operating engineers, 100 carpenters, 65 concrete finishers, and 65 laborers and miscellaneous workers.[1] With a peak period of two years for structural work on a new bridge, a peak demand of approximately 175 iron workers would be required.

Replacement Alternatives N-2, N-6, and S-4 are each calculated to generate slightly more than 4,000 total person years of employment over the construction period (see Table 4.1-1).

Impacts of Build Alternatives. Build alternatives will generate direct and indirect labor demand during a period lasting up to five years. Workers are expected to be drawn from the regional labor pool with specialty trades generating demand from outside the Bay Area. A portion of the specialty trades may be attracted to the Bay Area for the duration of the project. Because of the large Bay Area economy, consisting of approximately three million jobs, worker-generated demands for housing or community services are not expected to have a noticeable effect on San Francisco, Oakland, or other Bay Area community housing stocks or services. The project is expected to generate a beneficial impact to San Francisco and Oakland economies by generating direct and indirect jobs.

A beneficial impact is anticipated and no mitigation is required.

Neighborhoods

Oakland. A potential construction staging area would be built at the Oakland Army Base. Construction activity would not affect neighborhoods in West Oakland. Because the project would be built within San Francisco Bay, there would be no impacts to community cohesiveness or other permanent impacts to the neighborhood.

San Francisco (Yerba Buena Island). Construction of a retrofit alternative, temporary detours and replacement structures all have the potential to cause temporary neighborhood impacts to a limited number of San Francisco residents on Yerba Buena Island (YBI). This would consist of occupants of U.S. Coast Guard (USCG) housing and potential residents of Quarters 1-10 which are presently unoccupied. Because the occupants are members of the military, the housing does not constitute a conventional neighborhood in terms of tenure or character. Consequently, construction-related impacts will be relatively minor, compared to an established residential neighborhood. There would be no permanent impacts.

4.1.2 Community Services

No impacts to community services were identified under any of the categories: utilities, fire protection services, and police services. Permanent utility service would not be

[1] Richard Parrino, Parsons Brinckerhoff, March 1998.

disrupted by the project; police and fire protection services would not change as a result of the project, and access to the Treasure Island (TI) elementary school would not be affected by the project.

Alternative S-4 would touch a portion of the EBMUD dechlorination facility on the Oakland Touchdown. If Alternative S-4 is carried through to final design, the alignment would be modified to avoid any adverse impacts to the facility. No mitigation would be necessary.

4.1.3 Environmental Justice

Executive Order 12898 and Federal Highway Administration (FHWA) guidance documents require consideration of the impacts on minority and low-income "populations" and "communities." This section determines whether the relevant neighborhoods are "minority" or "low-income" according to demographic data from the U.S. Census Bureau. This section includes a discussion of project impacts on these neighborhoods to determine whether or not these are "disproportionate" in comparison with impacts on other neighborhoods within the project corridor. The environmental justice analysis requires a balance test of impacts associated with each alternative on each neighborhood. The comparison is made between alternatives as a whole, since environmental justice community impacts are not expected to vary between specific alternatives.

Neighborhood Evaluation

According to U.S. Census Bureau data, YBI/TI does not meet the criteria as a minority or low-income neighborhood (see Section 3.1.4). Although there are no families living within the project area, the West Oakland census tract, which includes the Oakland Touchdown area, does meet the low-income criteria and the criteria of containing an identifiable minority population.

The paragraphs below consider whether the project alternatives would have disproportionate impacts on the low-income, minority neighborhood identified in West Oakland.

No-Build Alternative. The No-Build Alternative would not impose disproportionate adverse impacts on the identified minority population. Therefore, the No-Build Alternative would not cause disproportionate impacts on minority or low-income neighborhoods, and with respect to this alternative, the requirements of Executive Order 12898 regarding environmental justice have been satisfied.

Retrofit Existing Structure and Replacement Alternatives. Impacts to traffic, parking, land use, socioeconomic condition, community facilities, geology, soils, hydrology, water quality, hazardous materials, noise and vibration, and visual setting have been assessed for the build alternatives. Build alternatives would not impose disproportionate adverse impacts on the minority West Oakland neighborhood because no project-related construction would occur in or adjacent to the residential areas of West Oakland. As indicated in Section 4.1.1 above, the alternatives might result in increased employment opportunities from which West Oakland could benefit.

The Retrofit Existing Structure and replacement alternatives would not cause disproportionate impacts on minority or low-income neighborhoods as defined by Executive Order 12898.

No disproportionate environmental impacts to low-income and minority neighborhoods would result from implementation of any of the project alternatives. No mitigation is required.

4.1.4 Impacts to Existing Land Use

This section describes changes in land use that would occur as a result of the project alternatives.

Changes in Land Use

Potential project-related changes to existing land uses on YBI and at the Oakland Touchdown are summarized in the following section. Permanent impacts are addressed here. Short-term construction-period impacts are addressed in Section 4.14.

Land Use Impacts on Yerba Buena Island.

No-Build Alternative. Implementation of the No-Build Alternative would not cause a change in any existing land uses on YBI. No impacts would result and no mitigation would be required.

Retrofit Existing Structure Alternative. The Retrofit Existing Structure Alternative would not cause any changes to existing land uses in the project area. The footprint of towers YB1, YB2, YB3, YB4, and Pier E1 would be expanded in size but would remain in their current locations. No new columns or piers would be constructed on the island. No impacts would result from the retrofit alternative and no mitigation would be required.

Replacement Alternatives. The replacement alternatives each begin east of the YBI Tunnel portal. The areas of impact for each of the three alternatives overlap. Many of the same buildings on the eastern edge of the island would be affected by all of the alignments.

Replacement Alternative N-2. Replacement Alternative N-2 is positioned to the north of the existing East Span. The alignment would place 14 piers between the YBI Tunnel east portal and the eastern edge of YBI. The alignment would also require construction of temporary detour structures to be used while the viaduct is retrofitted and transition structures on YBI are constructed. (Refer to Appendix A for alignment and detour structure drawings.) Impacts of the detour structures are discussed in Section 4.14.

The N-2 alignment would relocate the USCG access road to the south. This relocation would require the removal of Buildings 40 (administration), 75 (storage), and 270 (vacant).

An existing access drive serving vacant parcels at the northeast end of the island would be blocked (see Section 4.3.1). The alignment would not remove existing structures or block access to existing uses on the island.

The N-2 alignment would cross approximately 60 meters (190 feet) above vacant Buildings 213 and 262, but would not place columns at locations to obstruct access to the buildings. The alignment would be approximately 10 meters (33 feet) closer to Quarters 1 than the existing East Span (i.e., approximately 40 meters [130 feet] south of Quarters 1). The alignment would also be approximately 10 meters (33 feet) closer to Building 40. However, the proximity of the span would not affect access to either of these structures.

Potential for long-term impacts to existing land uses resulting from the N-2 Alternative would be limited to displacement of Buildings 40, 75, and 270 to relocate the USCG access road. Should Alternative N-2 be identified as the preferred alternative, Caltrans would work with the USCG to remove the facilities and provide reasonable compensation; relocate the structures; or redesign future access to avoid the structures, if possible. Based on these design considerations, no mitigation would be required.

Replacement Alternative N-6. Alternative N-6 is located to the north of the existing East Span in an alignment similar to Alternative N-2. The alignment would place approximately 18 piers between the YBI Tunnel east portal and the eastern edge of YBI. The alignment would require construction of temporary detour structures to be used while the viaduct is retrofitted and transition structures on YBI are constructed. (Refer to Appendix A for alignment and detour structure drawings.) Impacts of the detour structures are discussed in Section 4.14.

Alternative N-6 would displace Buildings 40, 75, and 270 to construct a new access road and gate for the USCG station. Construction of Alternative N-6 would require that the existing drive and gate to the station be moved south.

The N-6 alignment would cross approximately 60 meters (190 feet) above vacant Building 262, but would not place columns at locations to obstruct access to the building. The alignment would pass over the southern half of vacant Building 213, and a support pier would be located at the base of a pedestrian stairway on the east side of the building; however, pedestrian access to the stairway would be maintained throughout the construction period, or alternate means of access to public transport would be provided. The alignment would be approximately 10 meters (33 feet) closer to Quarters 1 than the existing East Span, approximately 40 meters (130 feet) south of the building and approximately 10 meters (33 feet) closer to USCG Building 40, but would not affect access to the structure.

Potential for long-term impacts to existing land uses resulting from the N-6 Alternative would be limited to displacement of Buildings 40, 75, and 270 to relocate the USCG access road. Should Alternative N-6 be identified as the preferred alternative, Caltrans would work with the USCG to remove the facilities and provide reasonable compensation; relocate the structures; or redesign future access to avoid the

structures, if possible. Based on these design considerations, no mitigation would be required.

Replacement Alternative S-4. Construction of Replacement Alternative S-4 across YBI would require 22 piers between the YBI Tunnel east portal and the eastern shoreline of the island. Temporary detour structures would be required on YBI during construction.

The S-4 alignment would cross approximately 60 meters (190 feet) above the northern half of Building 75, but would not place columns at locations to obstruct access to the building. The alignment would be approximately 30 meters (98 feet) closer to USCG Building 270 than the existing East Span. The S-4 Alternative alignment would place a pier at the location of Building 40 within the USCG complex, requiring removal of the structure. This two-story building is in use by the USCG for reserve training and USCG auxiliary functions. The S-4 Replacement Alternative would be located approximately 50 meters (164 feet) from Quarters 1 and 60 meters (197 feet) from Building 262.

Final design studies would be conducted for Replacement Alternative S-4, if identified as the preferred, to change the proposed locations of footings and support piers to avoid Building 40. If Building 40 cannot be avoided during final design, Caltrans will coordinate with the USCG concerning relocation of uses in the affected buildings (see Section 4.1.5).

Land Use Impacts at the Oakland Touchdown Area. The N-2 and N-6 replacement alternatives touch down to the north of the existing East Span while S-4, the southern alignment alternative, touches down south of the existing structure.

No-Build Alternative. Implementation of the No-Build Alternative would not cause a change in any existing land uses in the Oakland Touchdown area. No impacts would result and no mitigation would be required.

Retrofit Existing Structure Alternative. The Retrofit Existing Structure Alternative would not cause any changes to existing land uses in the Oakland Touchdown area. The bridge footprint would be modified only to increase the size of Pier E-23 at the western end of the touchdown area. No impacts would result from the retrofit alternative and no mitigation would be required.

Replacement Alternatives.

Replacement Alternatives N-2 and N-6. Replacement Alternatives N-2 and N-6, located to the north of the existing span, would have a similar approach to the Oakland Touchdown area. Both of the northern alignment alternatives will place five columns in the Oakland Touchdown area. The northern alignments would require the permanent displacement of 0.2 hectare (0.5 acre) of the City of Oakland-designated "Resource Conservation" lands to the north of the existing alignment.

Joint planning has been under way since 1997 with the City of Oakland, the Port of Oakland, East Bay Regional Park District (EBRPD), ABAG/Bay Trail, U.S. Army Base Reuse and Closure (BRAC), National Park Service, and the San Francisco Bay

Conservation and Development Commission (BCDC) to coordinate enhancement of the Oakland Touchdown area. Mitigation for impacts to "Resource Conservation" lands is being addressed through this joint planning process described in Section 4.9 and includes the possible creation of a public park and access area at the western end of the touchdown. Caltrans is already required to provide public access improvements in this area as part of the BCDC permit for the I-880/Cypress Replacement Project and the I-80 HOV Flyover Project. However, while these projects could result in 700 square meters (7,500 square feet) of public access improvements, the joint planning effort under way for the East Span Project would potentially provide up to 6.48 hectares (16 acres) for public access.

Replacement Alternative S-4. Replacement Alternative S-4 would place five columns in the Oakland Touchdown area. The alignment would occupy a portion of the first 450 meters (1,500 feet) of the Oakland Army Base vacant land to the south of the existing East Span and open storage areas used by Caltrans. Portions of the Caltrans-owned open storage areas on the south side of the span would be displaced by the S-4 Alternative.

Reduction of land within the Oakland Army Base would not result in a land use impact. If the land is used for park space, as is currently being discussed, joint park planning would wait to configure parkland design to accommodate the S-4 alignment.

4.1.5 Acquisition and Displacement of Existing Uses

The No-Build Alternative would not displace any existing residential, commercial or public buildings. Of the build alternatives, the N-2 and N-6 Replacement Alternatives would require the displacement of Buildings 40, 75, and 270 on YBI (see Section 4.1.4, "Land Use Impacts on YBI" above). Replacement Alternative S-4 would require the displacement of Building 40.

If final design studies cannot avoid the displacement of Buildings 40, 75, and 270, relocation benefits and assistance will be provided to the USCG to either move the structures or find replacement facilities. Caltrans will coordinate with the USCG to provide comparable facilities with as little inconvenience as possible.

4.1.6 Development Trends

The purpose of this section is to evaluate the relationship between the proposed project and anticipated development trends at YBI and the Oakland Touchdown area.

Yerba Buena Island/Treasure Island Draft Reuse Plan Consistency

The Treasure Island Draft Reuse Plan includes "Minimum" development scenarios based upon the existing capacity and access and a guiding policy for development of Naval Station Treasure Island which states that development should be limited to uses for which access can be accommodated primarily by ferry.

Vehicular access is a major constraint to development on YBI/TI. The East Span Project will not increase the SFOBB's capacity nor will it improve the access points from the SFOBB to YBI/TI. The City and County of San Francisco's (CCSF's) Treasure Island Draft Reuse Plan (TIDRP) includes development scenarios based on existing capacities and access and states that a guiding policy for development is to limit uses to those for which access can be accommodated primarily by ferry.

The development potential of Yerba Buena Island would be affected by the physical location of the project. Due to the steep topography of most of the island, the eastern end is considered by the CCSF to be the only viable location for development.

No-Build Alternative. The No-Build Alternative would not conflict with Draft TI Reuse Plan development scenarios, although vehicular access to and from the East Bay could be affected in the aftermath of an MCE.

Retrofit Existing Structure Alternative. Expansion of existing East Span columns on YBI would not conflict with redevelopment scenarios for YBI. The Retrofit Existing Structure Alternative is consistent with the reuse plan in that it does not include modifications to YBI on- and off-ramps that would change the capacity of existing vehicular access. YBI ramps are not owned by Caltrans and are not critical to providing a lifeline connection in the project corridor. Therefore, the retrofit alternative would not conflict with the transportation access assumptions of the draft plan.

No long-term impacts would result from implementation of the Retrofit Existing Structure Alternative and no mitigation measures would be required.

Replacement Alternatives N-2 and N-6. The northern alignments would require placement of footing and support piers across the eastern end of the island. The temporary spans for all alignment alternatives would also cross portions of this property. A site-specific redevelopment plan has not been published by the CCSF. Using the conceptual reuse drawing presented in the Draft Naval Station Treasure Island Reuse Plan, conflicts would occur with sites called out for a conference center, a series of live/work lofts and artisan cottages east of existing Quarters 1-7; and a possible restaurant, studio, or retail space at Building 262 (see Figure 4-1 in Appendix A). Because no adopted reuse plan exists, it is not possible to determine specific impacts.

The northern alternatives are consistent with the transportation element of the reuse plan because they would not modify YBI on- and off-ramps to change the capacity of existing vehicular access. The ramps are not owned by Caltrans and are not critical to providing a lifeline connection in the project corridor. One eastbound on-ramp is proposed for modification under the replacement alternatives, but would not change access capacity to the island. Therefore, Replacement Alternatives N-2 and N-6 would not conflict with the transportation access assumptions of the draft plan.

The development potential of the eastern end of YBI, as depicted in the Draft TI Reuse Plan, would be restricted due to the presence of footings and piers for the northern alignment alternatives and temporary detour spans. Removal of the existing SFOBB

would open a small amount of land for redevelopment. Potential Alternative N-2 and N-6 conflicts with draft reuse concepts as shown on Figure 4-1 in Appendix A. Construction-related impacts include the use of open areas on the eastern side of the island for construction staging and for equipment and material storage (see Section 4-13).

Caltrans has initiated consultation with the CCSF concerning the effects of the northern alignment alternatives and reuse plans. Joint planning efforts are also being discussed. The EIR/EIS for reuse plan has not yet been issued.

Caltrans will continue to coordinate with the CCSF. Should a northern alignment alternative be identified as the preferred, Caltrans will work with San Francisco representatives during final design to minimize the amount of land required for on-island bridge footings and columns.

Replacement Alternative S-4. The S-4 Replacement Alternative would locate the replacement structure to the south of the existing East Span and remove the existing bridge. As a result, the project would open up increased area for YBI redevelopment. Approximately 0.8 hectare (2.0 acres) of land that is currently occupied by the existing span could become available for development. This would be a beneficial impact as it relates to CCSF's redevelopment of YBI.

USCG Property Impacts

The development potential of the USCG property would be affected by project build alternatives. As part of the Base Reuse and Closure (BRAC) process, the Navy transferred 4.3 hectares (10.6 acres) to the USCG in April 1998. Of this land, 1.1 hectares (2.7 acres) is within the project area, and approximately 0.41 hectares (1 acre) is highly developable. No specific master plan has been developed for expansion of the existing USCG facility.

No-Build Alternative. The No-Build Alternative would not affect existing USCG facilities. The No-Build Alternate would not limit future redevelopment to a degree beyond the limitations currently imposed by the existing East Span.

Retrofit Existing Structure Alternative. Expansion of existing columns and footings would not conflict with existing USCG facilities or limit future redevelopment to a degree beyond the limitations currently imposed by the existing East Span.

Replacement Alternatives N-2 and N-6. The northern replacement alternatives would remove the existing structure, opening up land on the southeastern portion of YBI for USCG use. Although no future development plan is in place, this increased area, if made available to the USCG through the BRAC process for Naval Station Treasure Island and determined to be feasible for development, could increase future expansion options. This is considered a potentially beneficial impact to the USCG.

Replacement Alternative S-4. Footings and support piers for Replacement Alternative S-4 would use the southeastern portion of YBI and eliminate the potential for

expansion at this location. Because plans show no development for this area, no impact would result and mitigation would not be required.

Eastern Touchdown Area Port of Oakland Expansion Plan Impacts

The Port of Oakland has long-term plans under development that would expand Port operations onto existing Oakland Army Base property at the Oakland Touchdown.

No-Build Alternative. The No-Build Alternative would not conflict with Port of Oakland redevelopment plans.

Retrofit Existing Structure. The Retrofit Existing Structure Alternative would not require the use of existing Oakland Army Base property and would not conflict with Port of Oakland redevelopment concepts.

Replacement Alternatives N-2 and N-6. The northern alignment alternatives would not use Oakland Army Base property and would not conflict with Port of Oakland redevelopment concepts.

Replacement Alternative S-4. Replacement Alternative S-4 would adversely affect the ability of the Port of Oakland to develop and expand its existing facilities, as permitted under the BCDC-approved Seaport Plan. The Port estimates that the alignment would result in the loss of 6 to 12 percent of the area that could potentially be conveyed to the Port through the Oakland Army Base BRAC process. The southern half of the Oakland Touchdown area represents one of the few opportunities for the Port to expand their operations in the Oakland Touchdown area in the foreseeable future (see letter to Mr. Jon Rubin from Port of Oakland dated August 19, 1998, in Appendix G). These factors suggest that the S-4 Alternative may have a substantial effect on industrial/transportation-oriented development trends on the southern half of the Oakland Touchdown area.

Caltrans has initiated consultation with the Port of Oakland concerning development plans for the southern half of the Oakland Touchdown area. Caltrans and the Port of Oakland are participants in a joint planning effort to establish a public park and access area at the Oakland Touchdown area. (See discussion of Public Parks and Open Space below.) Representatives of the Port have stated their intention to work with the Oakland Gateway Joint Planning Group to develop design concepts which accommodate the East Span Project, Port activities, and public open space in the Oakland Touchdown area.

Caltrans will continue to coordinate with the Port of Oakland and other participating agencies in developing park and open space concepts for the Oakland Touchdown area.

Oakland Touchdown Area Public Parks and Urban Open Space

Joint planning has been initiated with the City of Oakland, Caltrans, the Port of Oakland, EBRPD, ABAG/Bay Trail, U.S. Army, National Park Service, and BCDC to create a "gateway" public open space at the Oakland Touchdown. East Span Project build alternatives have been identified as key components of the area.

No-Build Alternative. Under the No-Build Alternative, Caltrans would not continue to participate in cooperative park planning for the Oakland Touchdown area. However, BCDC's requirement (from the Cypress Project) that Caltrans implement public access improvements on the Touchdown would not be affected. Similarly, the EBRPD plans for a public park along the southern edge of the touchdown would not be affected by this alternative. The No-Build Alternative would not prohibit EBRPD development of parkland at the Oakland Touchdown area; therefore, no impact would occur and no mitigation would be required.

Retrofit Existing Structure. The Retrofit Existing Structure Alternative would provide limited opportunities for cooperative park planning because it would not contribute to assembly of a large contiguous parcel for open space use. However, BCDC's requirement (from the Cypress Project) that Caltrans implement public access improvements in the Touchdown area would not be affected. Similarly, the EBRPD plans for a public park along the southern edge of the touchdown would not be affected by this alternative. The Retrofit Existing Structure Alternative would not prohibit EBRPD development of parkland at the Oakland Touchdown area; therefore, no impact to development of parkland would occur and no mitigation would be required.

Replacement Alternatives N-2 and N-6. Cooperative planning to date has resulted in the development of design concepts for a gateway park under either the N-2 or N-6 Alternatives. The northern alignment alternatives would contribute to assembly of a large developable space to the south of the East Span alignment. Therefore, the northern alignment alternatives would have a beneficial impact on cooperative park development at the Oakland Touchdown.

Replacement Alternative S-4. The S-4 Replacement Alternative would contribute to the assembly of a large contiguous north-facing parcel for park development at the Oakland Touchdown. Therefore, the S-4 Replacement Alternative would have a beneficial impact on cooperative park development at the Touchdown.

Impacts to Planned Bay Access Sites

Under BCDC Permit 11-93, issued to Caltrans for the I-880/Cypress Freeway Replacement and I-80 HOV Flyover projects, Caltrans prepared conceptual design sketches for Bay access sites within the Oakland Touchdown area. The permit includes a fee-in-lieu provision should construction of the sites prove infeasible. Replacement alternatives would each require ongoing consultation with BCDC to determine the optimum locations of these public access overlooks.

No-Build Alternative. The No-Build Alternative would not interfere with implementation of the Bay access overlooks. No impact would occur and no mitigation would be required.

Retrofit Existing Structure Alternative. The Retrofit Existing Structure Alternative would not conflict with provision of the Bay access sites. However,

construction of the retrofit alternative could limit access to the planned sites during bridge retrofit construction activities.

Replacement Alternatives N-2, N-6, and S-4. Each of the proposed replacement alternatives would have an effect on the Special Conditions found in Permit 11-93. The northern alignment alternatives will preclude the implementation of an access area required by the BCDC for the northern side of the Oakland Touchdown. The S-4 Replacement Alternative would preclude the development of a west-facing lookout area, bicycle path, lookout roadway, and parking area permitted by the BCDC.

Caltrans has submitted to BCDC a request to amend Permit 11-93 to delay implementation of the access areas until completion of East Span construction. On July 31, 1998, BCDC amended Permit 11-93 to extend the period for construction of the public parks and overlook areas to December 31, 2006.

Caltrans will consult with BCDC following identification of a preferred East Span Project alternative to determine necessary Bay access modification or requirements under Permit 11-93. Any modifications to Bay access requirements will be identified as conditions in a future amendment to Permit 11-93.

4.1.7 Adopted Goals and Policies

The purpose of this section is to evaluate the relationship between the proposed project and existing land use, transportation, and BCDC policies guiding future development in the western and eastern touchdown areas.

Land Use Policies

Treasure Island Draft Reuse Plan (The City and County of San Francisco). The proposed project is consistent with CCSF's policies for future development and land uses within the project area. The replacement of the East Span will have no effect on CCSF's program to implement the guiding policies of the TIDRP (as listed on p.29) nor on CCSF's program to implement the goals and policies of CCSF's Master Plan. The TIDRP and CCSF's Master plan both are written with the clear assumption that the East Span will continue to provide an essential link for auto traffic between YBI and the East Bay.

The East Span Project would adversely impact CCSF's current development scenario for the eastern end of YBI. The Treasure Island Draft Reuse Plan (TIDRP) goals and policies identify the eastern end of YBI for publicly oriented uses and lodging. However, the goals and policies also identify the Bay Bridge structure and ramps as one of the institutional uses to be provided on YBI, as the bridge provides an essential link for auto traffic between YBI and the East Bay. Planned uses on the western side of YBI, and on Treasure Island itself, would not be affected by the East Span Project. The DEIR/DEIS for the reuse plan has not been issued yet.

City of Oakland (*Envision Oakland*). The East Span Project is consistent with Oakland's policies for future development and land uses within the project area. The replacement of the SFOBB East Span will have no effect on the City's program to implement the goals and policies of the General Plan.

The SFOBB is an integral part of the existing system that supports Oakland's vision of the City's "primacy as a transportation hub connecting the Bay Area with the Pacific Rim and the rest of the United States" (City of Oakland, *Vision 2015*).

The Oakland Touchdown area is located immediately adjacent to the City's seaport area (i.e., Port of Oakland facilities). The seaport area is classified as a showcase district in the City's General Plan. Showcase districts are dynamic areas that can respond to broad trends and market demands. The policy framework of the plan supports these districts in their continued growth and regional importance. The SFOBB provides an important link between the City's showcase districts, San Francisco, and the San Francisco Peninsula.

Oakland Policies t 4.5, t 4.9, and *t 6.3* support preparation of a Bicycle and Pedestrian Master Plan, the creation of a "gateway" public access area at the terminus of the East Span, and making the waterfront accessible to pedestrians and bicyclists. The East Span Project includes participation by Caltrans in joint planning efforts to create public access areas in the Oakland Touchdown area that will support implementation of these City policies. These characteristics of the SFOBB project also support the Waterfront Goals of the General Plan, relative to promoting public access to the waterfront.

The "New Bay Bridge," as the SFOBB East Span Project is described in Regional Access: Policies in Action, Chapter 3 of the City's General Plan, provides opportunities for increased bicycle, pedestrian, and transit access to the bridge. Additionally, the General Plan recommends that new parks and open space at the Oakland Touchdown should be integral components of the project. The proposed project includes features which are in keeping with the City's policies.

The northern replacement alternatives would have an impact on the areas designated by the City of Oakland as a Resource Conservation Area. This issue is discussed in Section 4.1.4, "Impacts to Existing Land Use."

Port of Oakland. The Port of Oakland has formally requested through the BRAC process that the Oakland Army Base property be conveyed to the Port to accommodate a planned expansion of Port facilities. The SFOBB East Span Project is consistent with the Port of Oakland's plans to expand its capacity and create additional areas for staging and storage. The BCDC-approved Seaport Plan allows the Port to increase the amount of usable land on the Touchdown by filling in a portion of the Bay south of the existing Touchdown area. This activity would not be precluded by any of the proposed alignment alternatives; however, the S-4 Replacement Alternative may affect the Port of Oakland's ability to use the area for Port purposes.

U.S. Coast Guard (USCG). The USCG does not currently have a master plan in place for the YBI facility. In general, the USCG plans to maintain its current level of

operations at the YBI facility, including 24-hour search and rescue, repair and maintenance of buoys, vessel traffic service, and law enforcement. The project as proposed would not substantially affect the current level of operations.

East Bay Regional Parks District (EBRPD). The EBRPD has formally requested through the BRAC process that a portion of the Oakland Army Base property south of the existing span be conveyed to EBRPD for development as a public park and access area. The East Span Project is generally consistent with the EBRPD's intention to provide a public park on the Touchdown. Preliminary coordination among the U.S. Army, EBRPD, and the Port of Oakland for joint planning of the area indicates that the proposed development is also consistent with the City of Oakland and BCDC policies and planning designations. Preliminary visions for the park include extension of the Bay Trail to the western edge of the Touchdown area, public amenities, and open space. The configuration of the trail and the open space is contingent upon selection of the East Span Project preferred alternative.

Transportation Policies

City of Oakland – Vision 2000. Oakland's transportation policy includes the following:

Objective T4. *Increase use of alternative modes of transportation.*

Policy T4.8 - Accommodating Multiple Types of Travel on the Bay Bridge. The City should encourage the design and engineering for the new Bay Bridge to accommodate multiple means of access and travel by automobiles, trucks, transit, bicycles, pedestrians, and future mass transit.

Each of the East Span Project replacement alternatives would accommodate multi-modal travel on the bridge. HOV bypass ramps would remain in operation at both the west and east bridge approaches to encourage carpools, vanpools, and bus transit use. Provision for future mass transit would be accommodated by continuation of AC Transit bus service and by design of the replacement structures to accommodate loading for light rail transit vehicles. Replacement alternative designs also include a pedestrian/bicycle path. The proposed project is consistent with this policy.

Policy T4.8 - "Gateway" Public Access Area. The City, in concert with the EBRPD, Port of Oakland, Oakland Base Reuse Authority, and BCDC, should support development of a significant new "gateway" public park area at the terminus of the SFOBB east span that can be reached by auto, bicycle, or walking.

The East Span Project includes coordination with the agencies concerned with future uses of land in the Eastern Touchdown area. Joint planning activities involving the City of Oakland, Port of Oakland, EBRPD, BCDC, National Park Service, U.S. Army, and Caltrans are in progress.

City and County of San Francisco Master Plan. CCSF's transportation policy includes the following:

Objective 1.

Policy 1. Involve citizens in planning and developing transportation facilities and services, and in further defining objectives and policies as they relate to district plans and specific projects.

The East Span Project is consistent with this policy as it has provided many opportunities for public involvement in the process.

Objective 4.

Policy 2. Where significant transit service is provided by buses, bridges and freeways should have exclusive bus lanes.

Efficient bus operations on the East Span Project alternatives are facilitated by provision of bus/carpool (HOV) bypass lanes at west and east bridge approaches. Provision of exclusive bus lanes has been considered as part of the East Span Project. It was determined that dedicated facilities would not provide any benefits. (See Section 2.5.)

Objective 5.

Policy 3. The existing vehicular capacity of the bridges, highways and freeways should not be increased and should be reduced where possible.

The East Span Project is consistent with this policy as it does not propose an increase to existing capacity.

Objective 8.

Policy 4. Accommodate bicycles on regional transit facilities and important regional transportation links.

The East Span Project replacement alternatives include designs for a pedestrian/bicycle path. The project is potentially consistent with this policy.

Association of Bay Area Governments – The Bay Trail. ABAG's plans for trails include the following:

Transportation Access Policies.

30. *Bridges and roads will be important connections in the Bay Trail system, providing not only commute routes, but enhancing the recreational use of the Trail by creating trail loops which will allow a greater number of people to enjoy the Trail.*

31. *In the short term, attention should be focused on improving safe access to the bridges, possible expansion of bicycle shuttle services and public transit accommodations of bicycles to allow crossbay access.*

32. *In the long term, unconstrained access on bridge structures is preferred. This can more easily be accomplished in planning future facilities, as long as public access is a requirement for new structures. Legislative action which would require bicycle and pedestrian access on new facilities should be actively sought.*

33. *Opportunities for cooperative funding of pedestrian and bicycle accessways should be investigated in order to make financing feasible.*

The East Span Project would be consistent with these policies because the replacement alternatives would provide an important connection to Bay Trails on both sides of the Bay. The East Span Project would improve access to the bridge and would enhance the safety of the bridge itself. The pedestrian/bicycle path is to be funded as outlined in Section 188 of the California Streets and Highways Code (CSHC).

San Francisco Bay Plan (Bay Conservation and Development Commission) Policies

Land Use. BCDC requires that every project provide the maximum feasible public access to the surrounding waterfront and/or shoreline. In joint planning meetings for the conceptual gateway park at the Oakland Touchdown area, BCDC concurred that it would consider combining the requirements to maximize public access specified in Permit 11-93 with any additional Bay access permit conditions that might be required for the East Span Project.

The East Span project would be consistent with this public access policy as Caltrans would provide bicycle, pedestrian, and vehicular access to the Touchdown area as part of both the East Span Project and BCDC's previous conditions of approval for the Cypress and I-80 projects. Shoreline public access is required as part of the Cypress and I-80 projects. Access could potentially be increased through a joint Port/EBRPD effort to create a public park of up to 6.48 hectares (16 acres) on the western end of the Touchdown (see the East Bay Regional Parks District discussion below for further details).

The proposed project is consistent with the BCDC's policies for future development as contained in the San Francisco Bay Plan, and the replacement of the SFOBB East Span will have no effect on the BCDC's program to promote its policies guiding land use and development around the Bay. The Bay Plan strongly encourages that new transportation facilities be designed to encourage usage of mass transit. The proposed project is consistent with this policy, as the proposed alternatives would maintain the HOV bypass lanes at the toll plaza and west approach that presently take buses and carpools around congestion points. The Bay Plan also strongly encourages development and use of public parks. The configuration of overlooks required as part of the Cypress and I-80 projects would be affected by the East Span Project. However, given the intent of EBRPD and other parties to provide a much larger area for public

access and amenities south of the span, Bay access requirements for parks and overlooks are expected be fulfilled. EBRPD plans for this area are independent of the East Span Project.

Transportation. The BCDC Bay Plan includes the following:

Policy 4. *If a route must be located across a waterway, the following provisions should apply:*

a. *The crossing should be placed on a bridge or in a tunnel, not on solid fill.*

b. *Structures should provide adequate clearance for commercial ships, Navy ships, and pleasure boats to have uninterrupted passage at all times.*

c. *Toll plazas, service yards, or other ancillary features should not be located on new fill.*

d. *To provide maximum ultimate capacity on any new route that is allowed over or under a waterway (and thus to minimize the number that might have to be allowed in the Bay), the design of the route should, if feasible, accommodate future mass transit facilities and subsequent installation of automatic power and guidance elements for vehicles.*

The East Span Project is consistent with BCDC policy "a." All alternatives propose a bridge crossing. Concerning policy "b", the height of all alternatives under consideration has been set in consultation with the USCG to provide adequate navigational clearance. Project alternatives would not require new fill for ancillary facilities. The project alternatives are, therefore, consistent with policy "c". Although the project does not propose a new route over the Bay, project alternatives are consistent with policy "d" in that consideration is being given to accommodation of structural loading requirements for future light rail transit.

Dredging and Fill. Bay Plan Dredging Policy 1, sets policies to prevent sedimentation resulting from dredging projects by stating that dredge materials be disposed of by:

a. Dry land disposal
b. Placement as fill in approved locations
c. Ocean disposal
d. In-Bay disposal at designated locations

Dredging required for the project would result from construction activities (see Section 4.14.9). Caltrans has initiated consultation with BCDC and other regulatory agencies through the Dredged Materials Management Office (DMMO) concerning disposal of dredged materials (see correspondence in Appendix G).

The Bay Plan regulates fill, requiring that fill be minimized and permitted only if it meets certain conditions. The condition that applies to the East Span Project is Condition #2,

fill required for which there is no other alternative (i.e., airports, roads, and utility routes). The East Span Project is consistent with this policy because alternatives would be bridge structures. Fill associated with the build alternatives would be limited to bridge piers and limited fill at the bridge approach structures.

Visual. Bay Plan policies related to appearance of bridge structures address maximization of views to and from bridges and the visual prominence of bridge towers. The Retrofit Existing Structure Alternative is generally consistent with these policies in that retrofit of the existing bridge would not change existing railing heights or add substantial new superstructure that would decrease motorists' views. Modifications to substructure, including addition of two bridge piers and expansion of existing piers would not change the basic visual form of the existing structure.

The replacement alternatives are consistent with Bay Plan visual policies. Bay Plan policies concerning views to and from the bridge and tower type and design were incorporated into design recommendations developed by the MTC Bay Bridge Design Task Force Engineering and Design Advisory Panel (see Appendix E).

Bay Plan Conformity Determination. Caltrans has initiated and will continue coordination with BCDC throughout the environmental phase of the project to assure project conformity with the Bay Plan (see Appendix E for discussion of BCDC participation in the NEPA/404 Integration MOU process) and to assure that the identified preferred alternative in the Final EIS would conform to Bay Plan policies. BCDC requires an approved Final EIS and detailed engineering design to make their Federal Bay Plan consistency determination.

The Final EIS and detailed engineering will be provided to BCDC during final project design, after the Final EIS and Record of Decision approval, for BCDC use in its federal consistency and Bay Plan permit process.

4.2 TRANSPORTATION

The proposed alternatives would affect transportation, including local traffic, transit, and maritime traffic. The alternatives would also affect building and parcel access and parking on YBI and in the Oakland Touchdown area. Construction-related impacts are discussed in Section 4.14

4.2.1 Vehicular Circulation and Access

For each alternative, changes in vehicular traffic circulation, operations, and access time are identified, and measures are proposed to mitigate potential impacts.

SFOBB Traffic Operations

Traffic operations under the No-Build Alternative and the Retrofit Existing Structure Alternative would remain the same as under existing conditions. Each of the East Span replacement alternatives may improve traffic operations on the SFOBB: the addition of 3-meter (10-foot) shoulders on both sides of the roadway would provide refuge for disabled vehicles. This may reduce non-recurrent congestion caused by minor accidents or stalls that block one or more lanes of traffic. The extent of non-recurrent congestion caused by major incidents is unlikely to be affected by the addition of a shoulder.

All of the proposed alternatives for the East Span replacement may result in long-term adverse impacts to SFOBB traffic operations during traffic incidents. When an incident occurs on a typical freeway segment, secondary congestion frequently occurs in the opposite direction of travel as a result of drivers slowing to view the incident. When an incident occurs on either the upper or lower deck of the existing SFOBB, there is currently no impact to traffic headed in the opposite direction because drivers are unable to see opposing traffic or incidents. The proposed replacement structures would place eastbound and westbound traffic at the same level, creating opportunities for drivers to see incidents on the opposite structure, which may cause delays in the non-incident travel direction. A glare screen installed on the median barrier railing could minimize the visibility of incidents to opposing traffic.

Yerba Buena Island

There would be no long-term impacts to access or transit operations on YBI, from the No-Build Alternative, Retrofit Existing Structure Alternative, or the replacement alternatives. The replacement alternatives would, however, create long-term changes in traffic circulation. Neither the No-Build nor the Retrofit Existing Structure Alternative would affect traffic circulation on YBI.

Traffic Circulation. For each of the East Span replacement alternatives, the East Span Project would restore the original roadways and driveways on YBI following construction. The alternatives would have no impact on long-term vehicular access and circulation, with the following exceptions.

Replacement Alternative N-2 Two columns would encroach about 4 meters (13 feet) into the southern edge of the paved area of the hairpin turn on Macalla Road at

the undercrossing. Narrowing the road to accommodate these columns would potentially conflict with turning movements of large vehicles.

Three bridge columns would be located in the right-of-way of the existing USCG station entrance road, potentially blocking vehicle passage.

To accommodate turning of large vehicles, Macalla Road would need to be widened to the north, making it marginally steeper.

Construction of Alternative N-2 would require relocation of the existing USCG station access road and gate. Relocation of the road to the south is proposed as shown on Figures 2-7.1a and 2-7.1b in Appendix A.

Replacement Alternative N-6. Columns would encroach 6 and 3 meters (20 and 10 feet), respectively, into the southern edge of the paved area of the hairpin turn on Macalla Road at the undercrossing. Narrowing the road to accommodate these columns would potentially conflict with turning movements of large vehicles.

A column would encroach about 5 meters (16 feet) into the west side of the intersection of the USCG station entrance road and the first east/west driveway. The intersection would need to be realigned to the east and the driveway re-graded, which may require a new retaining wall.

To accommodate turning of large vehicles, Macalla Road would need to be widened to the north, making it marginally steeper.

Construction of Alternative N-6 would require relocation of the existing USCG station access road and gate. Relocation of the road to the south is proposed as shown on Figures 2-10.1a-c in Appendix A.

Replacement Alternative S-4 Two columns would encroach about 2 meters (6.5 feet) into the southern edge of the paved area of the hairpin turn on Macalla Road at the undercrossing. Narrowing the road to accommodate these columns would potentially conflict with turning movements of large vehicles.

To accommodate turning of large vehicles, Macalla Road would need to be widened to the north, making it marginally steeper.

Oakland Touchdown Area

No-Build Alternative, Retrofit Existing Structure Alternative, Replacement Alternatives N-2 and N-6. The No-Build Alternative, Retrofit Existing Structure Alternative, and Replacement Alternatives N-2 and N-6 would have no long-term impacts to traffic circulation, access, or transit.

Replacement Alternative S-4. Replacement Alternative S-4 would not affect existing transit service in the Oakland Touchdown area, but would require modification of existing access patterns.

Under Replacement Alternative S-4, Burma Road and the existing Caltrans maintenance road would need to be realigned. Port operations to the east of the S-4 alignment would continue to be accessed by Burma Road, which would be truncated at existing Terminal Seven. Access to the western end of the Touchdown area would be reconfigured to the north, using an extension of the Radio Point Beach access road. No loss of access would occur to Caltrans maintenance buildings or other utility structures at the western end of the touchdown. (See Figures 2-11.4 and 2-11.5 in Appendix A.)

Local access roadway reconfigurations would be part of the construction of the S-4 Replacement Alternative. Realigned access roadways would serve existing facilities and any future park development. No impacts due to change in access would result; therefore, no mitigation is proposed.

4.2.2 Non-Motorized Traffic: Pedestrians and Bicycles

Pedestrian and non-motorized traffic is currently prohibited on the existing East Span and no dedicated, signed pedestrian/bicycle paths exist within the project area. Project alternatives have been assessed for potential to accommodate planned and proposed pathway connections and the replacement alternatives each incorporate a pedestrian/bicycle path.

Citizen participation in planning for the pedestrian and bicycle path on the East Span has been facilitated by the MTC and Caltrans through the Bay Bridge Bicycle/Pedestrian Advisory Committee (BPAC) and the MTC Elderly/Disabled Advisory Committee (EDAC).

Yerba Buena Island

There are no signed bicycle paths or lanes on YBI and the U.S. Navy and CCSF have no plan in place for the creation of a pedestrian/bicycle facility network on the island. Pedestrian and bicycle use of public street rights-of-way on YBI would be possible under any East Span Project alternatives. Therefore, project alternatives are not expected to have an impact on existing pedestrian and bicycle circulation on YBI.

However, the staircase on YBI linking the USCG base with the bus stop at the top of the hill would be displaced due to the placement of the bridge footings for Replacement Alternatives N-2 and N-6.

The stairway would be rebuilt at a new location or in a new alignment to avoid the new bridge footings. Caltrans would select the site for the replacement stairway in consultation with the USCG, U.S. Navy, and CCSF.

Oakland Touchdown Area

No-Build and Retrofit Existing Structure Alternatives. The No-Build and Retrofit Existing Structure Alternatives would have no impacts to pedestrian and bicycle circulation in the Oakland Touchdown area.

Replacement Alternatives. The replacement alternatives would create no permanent impacts to pedestrian and bicycle circulation in the Oakland Touchdown area. Each of the replacement alternatives would provide pedestrian/bicycle path access to any Bay or future park sites and would provide sufficient vertical clearance where necessary to permit a bicycle and rider to travel under bridge structures.

East Span Pedestrian/Bicycle Access

Proposed bridge alternatives have been evaluated for potential to provide pedestrian and bicycle access to and on the East Span. Criteria used to assess project impacts are:

- Ability to incorporate a pedestrian and bicycle path on the East Span
- Suitability of profile grades
- Connectivity to pedestrian and bicycle access at either the Oakland Touchdown area or YBI
- Creation of dangerous or inconvenient features that affect access at the Oakland Touchdown area or YBI

No-Build and the Retrofit Existing Structure.

Path Accommodation and Placement. The No-Build and the Retrofit Existing Structure Alternatives do not incorporate a new pedestrian and bicycle path. The existing cross section of the bridge has five 3.3-meter (11-foot) travel lanes with no roadway shoulders, limiting the ability to restripe the bridge deck to accommodate a path on the bridge. A pedestrian and bicycle path could, however, be added to the exterior of the cantilever structure as a separate project. The No-Build and Retrofit Existing Structure Alternatives would not preclude a pedestrian and bicycle path.

Replacement Alternatives N-2, N-6, and S-4.

Path Accommodation. A pedestrian and bicycle path has been incorporated into each replacement alternative (see Figure 2-8 in Appendix A). A path on the replacement alternatives would be constructed 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 the adjacent travel lanes. This configuration was requested by the advisory committee and the MTC. Provision of pedestrian/bicycle access on the East Span would be a beneficial effect.

Access at Yerba Buena Island. A path located on the south side of the eastbound replacement structure would connect with Treasure Island Road on YBI. Pedestrians and bicyclists using the SFOBB East Span pedestrian/bicycle path would be provided with direct access to existing street rights-of-way (Treasure Island Road) on YBI. The connection would allow for circulation on YBI and TI streets, except those streets with restricted access. Caltrans will incorporate directional signage for path users into the project design. Should the Navy or the CCSF desire that access be specifically directed, limited, or prohibited, Caltrans will work with these agencies to design signage or barriers.

Access at Oakland Touchdown Area. Access to and from the replacement alternatives would be from the south side of the eastbound structure. It is likely that a future Bay Trail extension would connect with the East Span structure.

Conformance with Local Plans and Policies
Each of the East Span Replacement Alternatives would provide a pedestrian and bicycle path between YBI and the Oakland Touchdown area. Provision of the path would be in conformance with the following local plans:

- City of San Francisco, Naval Station Treasure Island Reuse Plan,
- San Francisco Bay Conservation and Development Commission,
- City of Oakland Pedestrian and Bicycle Master Plan,
- Association of Bay Area Governments Bay Trail Plan.

Impacts to SFOBB Bicycle Shuttle Service
All East Span Project alternatives could accommodate the existing Caltrans bicycle shuttle service.

4.2.3 Parking

For each alternative, changes in long-term parking supply resulting from project alternatives have been identified.

Yerba Buena Island
No-Build Alternative. The No-Build Alternative would not modify the number of parking spaces on YBI.

Retrofit Existing Structure. Strengthening of existing column YB3 under the Retrofit Existing Structure Alternative would eliminate approximately four informal parking spaces in the paved area east of Quarters 1. Given the large undeveloped area available for parking, the loss of four parking spaces at the eastern end of this area would not contribute to unmet parking demand and would not create an impact. No mitigation would be necessary for this minor change in parking supply.

Replacement Alternatives. Each of the East Span Replacement Alternatives would eliminate between 6 and 8 informal parking spaces in the paved area east of Quarters 1. Given the large undeveloped area available for parking, the loss of this small number of parking spaces would not contribute to unmet parking demand and would not create an impact. No mitigation would be necessary for this minor change in parking supply.

Oakland Touchdown Area
There would be no long-term loss of parking spaces under any of the project alternatives.

4.2.4 Marine Traffic

The potential for ship collisions with the East Span alternatives has been evaluated. Effects of impacts to the structures from vessel types likely to use the waters under the bridge are presented here.

Methodology

Information regarding type, size, and frequency of vessels that use the shipping channel east of YBI was collected to determine vessels likely to pass under the East Span in open water. The largest vessel currently using the east navigation channel is a fuel barge.

American Association of State Highway and Transportation Officials (AASHTO) specifications[2] were used to estimate impact loads on towers and piers. Head-on and side impact collisions were considered. To evaluate worst-case impacts, it was assumed that cruise ships could use the east channel under potential development scenarios for TI. The vessel's speed, mass, and crushing of its hull were considering in developing impact loads. Cruise ships, being larger than existing barges using the east navigation channel, would generate the largest impact loads.

No-Build Alternative

The No-Build Alternative would not modify the existing East Span and would not change navigation patterns through the existing shipping channel. No modifications to the bridge are proposed under this alternative; therefore, no modifications would be constructed to minimize impacts of future ship collisions.

Retrofit Existing Structure Alternative

The Retrofit Existing Structure Alternative would strengthen existing piers in the navigation channel, shorten spans, increase the ability of the structure to withstand impact from a maximum-design cruise ship at the main span piers and impacts of barges at the shorter span piers. More piers would increase the likelihood of a collision between a vessel and a pier. The additional piers would also narrow the existing navigation channel. The alternative would maintain a width of at least 152 meters (500 feet) between piers in the navigation channel and a vertical clearance of 42 meters (138 feet) over mean high water,[3] and the resulting channel width would conform to USCG standards.

Replacement Alternatives N-2, N-6, and S-4

As part of bridge design, protective fenders are proposed at the main tower and skyway piers to provide sufficient standoff to prevent vessels from hitting pier columns and reduce pile cap damage on impact. The fenders could be either pile-supported or pile cap-mounted. One possible fender system would have a timber-rubbing face and remains elastic up to a particular level of impact energy. Beyond this level, it absorbs energy by damage to the concrete and timber, but is designed to be easily repaired.

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[2] AASHTO Guide Specifications and Commentary for Vessel Collision Design of Highway Bridges, Volume I: Final Report, February 1991, American Association of State Highway and Transportation Officials, Washington, D.C.

[3] U.S. Coast Guard. Facsimile transmittal from Wayne Till (USCG) to Tony Wong Caltrans. March 6, 1997.

The system also provides a wearing surface on the pier for minor collisions and bumps from merchant and recreational vessels.

In reviewing bridge designs, all skyway foundations were found to be able to withstand the impact of a light drifting barge, and skyway piers would be able to withstand the maximum-design barge impact. The main towers and skyway pier foundations would be capable of sustaining impacts for the maximum-design cruise ship.

No potential for significant damage to project alternatives has been identified, due to design of piers and fender systems, and no mitigation is required.

Each of the replacement alternatives would narrow the existing navigation channel. The replacement alternatives would maintain a width of 152 meters (500 feet) between piers in the navigation channel and a vertical clearance of 42 meters (138 feet) over mean high water, and the resulting channel width would conform to USCG standards. The project would install all applicable navigation aids, such as fenders and lights.

4.2.5 Air Traffic

The No-Build and Retrofit Existing Structure Alternatives would not change the location or height of towers and would not require changes to obstruction markings or lighting to alert aircraft to the presence of the existing East Span.

The replacement alternatives would change existing obstruction markings and lighting. FAA Form 7460-1, "Notice of Proposed Construction or Alteration," would be filed with the FAA. The form, to be filed following selection of the preferred alternative, would disclose the location and height of a cable-supported tower (if selected). Because main span towers proposed with replacement alternatives, cable-stayed and self-anchored suspension design variations would exceed 61 meters (200 feet) in height, warning lights atop the tower would be required.

4.3 VISUAL IMPACT ANALYSIS

The following section describes the visual effects of the various project alternatives on each of the landscape units which make up the project area, as well as the changes in visual quality that would be experienced from the 17 representative viewpoints around the Bay Area. In addition, the changes in visual quality for motorists traveling on the East Span are also discussed.

4.3.1 Effects on Landscape Units and Visual Image Types

The change to each of the five landscape units was assessed for each of the four build alternatives and a number of design variations. The impact on landscape units and visual image types is evaluated for the period when the bridge is in full operation. Each landscape unit would be affected differently according to the combination of these alternative/design variations.

Yerba Buena Island

Retrofit Existing Structure Alternative. The retrofit alternative would not require alteration of visual features on the island. Operation period would be identical to what exists today. All visual image types within this landscape unit would remain intact. Adding substantial structural members on the outside of the cantilever superstructure would add clutter and mass to existing bridge.

Skyway/Signature Bridge Design Variations. Following the construction and dismantling of the existing bridge, the Yerba Buena Island landscape unit would appear altered by the removal of portions of the woodland area to the north and/or south of the span. The width of the bridge itself would also be altered because the side-by-side, single-deck roadway design would be double the width of the existing span.

Replacement Alternative S-4 would reduce the size of the USCG facilities, although the structures that could be removed are not currently visible from the existing span. Similarly, Replacement Alternatives N-6 and N-2 would reduce the image type represented by removing Buildings 40, 75, and 270. These structures are not currently visible from the existing span.

The most substantial alteration of this landscape unit would occur through the removal of woodland vegetation that would require a number of years to reestablish itself. It is probable, depending on the amount of clearing required, that residential structures currently obscured by the vegetation would become visible.

Main Span (Cantilever Section)

Retrofit Existing Structure Alternative. Following the seismic strengthening measures, the landscape unit would reflect a slight increase in view blockage as a result of the introduction of two new piers. This would not be considered a substantial visual impact. The Bay would remain the predominant visual image type within this landscape unit.

Skyway Bridge Design. Following the construction and dismantling period, this landscape unit would appear much different. The bridge design would exhibit a much narrower profile than the existing structure because the cantilever element would not be present. In addition, the bridge would be a single-deck rather than a double deck roadway. The steel cross beams that extend from the upper to lower deck on the existing structure would no longer be present. The skyway design variation profile would consist of a simple concrete sidewall along either side of the deck, reading like a ribbon from points north and south. The predominant visual image type within this landscape unit would be the Bay.

With Replacement Alternatives S-4 and N-6, views toward the skyline of San Francisco would be expanded for westbound travelers, while Replacement Alternative N-2 would produce views similar to the existing span. Eastbound travelers would experience expansive views toward the Port of Oakland and toward the hills above the communities of Oakland, Berkeley, and Alameda, although visibility to the south would be reduced by the presence of a 4.7-meter (15.5-foot) wide bicycle/pedestrian lane.

Signature Bridge Design Variation. Following the construction and dismantling period, the landscape unit would be dominated by a much taller and different signature tower element. The contrast between the existing cantilever and truss elements and the proposed single tower element would be dramatic. The bridge would also be modified through the removal of the double deck roadway. The single deck, side-by-side roadway would produce a much narrower profile, and the image of the bridge would be sleeker and lighter, because there would no longer be steel beams connecting the upper and lower decks. The predominant visual image type would remain the Bay.

As with the skyway design variation, the S-4 and N-6 Replacement Alternatives would produce expanded views toward the skyline of San Francisco for westbound travelers, while Replacement Alternative N-2 would produce an effect similar to the existing span. Eastbound travelers would experience expansive views toward the Port of Oakland and toward the hills above the communities of Oakland, Berkeley, and Alameda, although views to the south may be compromised by the presence of a 4.7-meter (15.5-foot) wide bicycle/pedestrian lane.

Incline Section

Retrofit Existing Structure Alternative. The retrofit alternative would produce the least amount of change from the existing span. The span would continue to have two bridge decks connected by steel beams. The predominant visual image type of the incline section would remain the Bay. No change in the SFOBB's alignment would occur, the bridge would appear visually much as it does today.

Skyway/Signature Bridge Design Variations. Both the skyway and the signature bridge design variations would provide a skyway deck along this portion of the span. The greatest change to this landscape unit involves the replacement of the existing double deck structure with side-by-side single decks. The effect of this change would be that the bridge would more than double in width, while the height of

the deck area would be reduced. Views from the bridge would expand because of the reduced height of the bridge rail, which would facilitate views from passenger vehicles, and absence of the upper deck for eastbound motorists. The predominant visual image type of this section of the bridge would remain the Bay.

Replacement Alternative S-4 would offer the greatest change in viewshed as it follows a more southerly alignment, while Replacement Alternatives N-6 and N-2 remain closer to the SFOBB's existing alignment along this section of the bridge. Views to the south, however, may be compromised by the presence of a 4.7-meter (15.5-foot) wide bicycle/pedestrian lane.

Oakland Touchdown

Retrofit Existing Structure Alternative. The retrofit alternative would produce the least amount of change from the existing span. The visual image types currently present at the touchdown area would not be altered with the implementation of the retrofit alternative. The alignment of the East Span would not change and additional right of way would not be required for its construction. The predominant visual image types would remain marsh and estuary areas and light industrial.

Skyway/Signature Bridge Design Variations. Replacement Alternatives N-6 and N-2 would require construction within a portion of the area designated for resource conservation by the City of Oakland to the north of the existing span. Replacement Alternative S-4 would require construction within most of the undeveloped and light industrial land to the south of the existing span. The result of this change in the SFOBB's existing alignment would be a reduction in the visual image type (marsh, estuary, and light industrial) associated with the land taken by the replacement alternatives.

The bridge itself would produce a much narrower profile and would be a lighter, more streamlined structure. The steel cross beams that currently extend between decks would not be present, and the single decks would be placed side-by-side rather than stacked one on top of another. Views from the structure would be similar to what exists today as the bridge at this point is rejoining the SFOBB's existing alignment as it approaches the toll plaza. Views to the south, however, may be compromised by the presence of a 4.7-meter (15.5-foot) wide bicycle/pedestrian lane.

SFOBB Toll Plaza

The toll plaza area would not undergo substantial change as a result of the project. The proposed replacement alternatives would rejoin the existing roadway at the toll plaza. The location of the toll booths would not change, and the realignment of the roadway to the north or south would not substantially affect the existing visual appearance of this landscape unit. Because of the level topography of the toll plaza, views from the roadway to the Bay and to the Port of Oakland would remain open and virtually unobstructed as vehicles proceed westward along the touchdown area toward the incline section of the span.

4.3.2 Effects on Views from the Bridge

The following section describes the visual changes that motorists traveling on the SFOBB East Span would experience under the retrofit and replacement alternatives. To aid in this evaluation, an animation of the motorists' view was created for the replacement alternative signature bridge design variation. Still pictures of key views from this animation are presented in this section (see Figures 4-2 to 4-4 in Appendix A). The animation is provided on a CD-ROM included in the Visual Impact Assessment Report which can be reviewed at locations identified in the Preface and on the worldwide web at www.dot.ca.gov/dist4.

Retrofit Existing Structure Alternative

The retrofit alternative would only slightly change motorists' views from the existing East Span. The current double-deck structure would be maintained, including its solid steel sidewalls that block some motorists' views of the Bay. Steel crossbeams that extend from the upper to the lower deck would be modified to permit large displacements at specified joints. As a result, views would continue to be restricted, especially in the eastbound direction, where the presence of the westbound deck overhead results in a further obstruction to the viewshed. Adding substantial structural members on the outside of the cantilever superstructure would add clutter and mass to existing bridge.

Skyway Design Variation

The skyway design variation would result in substantial changes to the motorists' view, because it would create side-by-side roadway decks with sidewalls and railings designed to facilitate views from the structure. Because the skyway design variation would not include a signature structure, views would remain unobstructed throughout the length of the East Span.

Although views from the East Span with the skyway design variation would be greatly expanded, three design issues would have an effect upon the extent of views from the structure. First, the roadways would be placed side by side. The effect of side-by-side roadways would be that a viewer would have a five-lane roadway in the foreground of their view to the north (when traveling in the eastbound direction) or south (when traveling in the westbound direction). (See Figures 4-2 to 4-4 in Appendix A). Second, the addition of a 3-meter (10-foot) shoulder on each side of the roadway further expands the structure in the motorists' foreground view. Finally, the creation of a 4.7-meter (15.5-foot) wide pedestrian/bicycle path on the south side of the eastbound bridge deck would affect views southward from the East Span. The bicycle and pedestrian lane would be raised 0.3 meter (1 foot) above the flow of auto traffic, further restricting views to the south.

When comparing Replacement Alternatives, N-6 and S-4 would expand westbound views toward the City of San Francisco because of their distance from the existing East Span, which would allow views around YBI. Replacement Alternative N-2 would expand views to a lesser degree because it closely follows the alignment of the existing East Span.

Signature Bridge Design Variation

The signature bridge design variation would also expand views from the East Span because, as with the skyway design variation, the East Span would be constructed with side-by-side roadways, sidewall features, and railings to facilitate views from the structure. The signature structure and cables would somewhat obstruct views as vehicles pass through the main span section. However, overall views would increase greatly when compared with the existing structure.

The design issues noted above for the skyway design variation would have a similar effect on views from the signature structure. The creation of side-by-side single decks, the addition of 3-meter (10-foot) shoulders, and the construction of a 4.7-meter (15.5-foot) pedestrian/bicycle path would restrict views from the East Span to the north and south. Figures 4-2, 4-3, and 4-4 in Appendix A depict a motorist's view while driving on the signature bridge variation.

When comparing Replacement Alternatives, N-6 and S-4 would expand westbound views toward the City of San Francisco because their distance from the existing East Span would allow views around YBI. Replacement Alternative N-2 would expand views to a lesser degree, because it would closely follow the alignment of the existing East Span.

4.3.3 Effects on Views to the Bridge

The changes in visual quality due to the project alternatives have been analyzed from 17 viewpoints around the Bay Area, as described in Section 3.3.3. Generally, the changes that would occur with each of the various project alternatives and design variations would be similar from each of the viewpoints. The analysis from four viewpoints has been included in this report to represent the changes in visual quality from each location. These viewpoints are Richmond (from the north), the Oakland Touchdown area (from the east), the Oakland-San Francisco Ferry (from the south), and Treasure Island (from the west). This analysis, which includes computer-generated visual simulations, follows.

Effect of Build Alternatives

The retrofit alternative would have a negligible effect on visual quality from distant viewpoints, because 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 effect on viewers, as the additional structural elements (new piers and strengthening of existing piers) would obstruct views underneath the bridge.

The signature bridge design variation would result in the most favorable effect upon visual quality regardless of the viewpoint location. Typically, this is due to the increase in the vividness of the span and the overall unity that would occur with the signature bridge design variation. While conditions would vary at individual viewpoints, overall, the three replacement alternatives (N-2, N-6, and S-4) would result in virtually identical visual effects.

The skyway design variation would result in the greatest reduction in visual quality. Typically, this effect would be due to a reduction in the vividness and intactness of the span caused by the simpler structure and thinner bridge deck. While conditions would vary at individual viewpoints, overall, the alignments of the three replacement alternatives under the skyway design variation would result in virtually identical visual effects.

Analysis from Representative Viewpoints

Richmond Marina.

Retrofit Existing Structure Alternative. The retrofit alternative would have a negligible effect on visual quality. The long distance from this viewpoint to the East Span would make changes to the piers and support structures imperceptible.

Skyway Design Variation. The skyway design variation would have a minimally adverse effect on visual quality, due to its reduction in vividness (see Figure 4-5 in Appendix A). While it would remain at a favorable viewing angle, the simplicity of the structure would eliminate the striking and distinctive nature of the existing East Span.

Signature Bridge Design Variation. The signature bridge design variation would have a minimally beneficial effect on the visual quality of the view towards the East Span, due to the increase in vividness (see Figure 4-6 in Appendix A). The signature tower would add landmark strength and distinctiveness, but the distance between the viewpoint and the East Span would make its distinct elements difficult to discern.

The signature bridge design variation would have a beneficial effect on the overall visual quality from the Richmond Marina, due to the increase in the vividness of the East Span and overall unity of the view. Unity would increase the greatest amount (from moderate-to-high to high) for the suspension bridge design variation, due to the visual similarity, prominence, and shape, compared with the SFOBB West Span (which would be visible from the vantage point). Unity would increase less (remaining at moderate-to-high) with the cable-stayed bridge design variation, because its shape would not echo the catenary forms of the SFOBB West Span.

Oakland Touchdown Area.

Retrofit Existing Structure Alternative. The retrofit alternative would result in a minimally adverse effect on visual quality of the view toward the East Span, due to the increase in view obstruction. New support piers and other structural elements added as part of the retrofit alternative would decrease views beneath the East Span.

Skyway Design Variation. The skyway design variation would result in a minimally adverse effect on visual quality, due to the slight decrease in the vividness of the East Span (although the East Span's close proximity and prominence mean vividness would still remain high) (see Figure 4-7 in Appendix A). In addition, with Replacement Alternatives N-2 and N-6 there would be a slight increase in view obstruction. These alternatives would provide views similar to the existing East Span,

although its more gradual rise from west to east would obstruct views from beneath the East Span to the north.

Signature Bridge Design Variation. The signature bridge design variation would result in a minimally beneficial effect on visual quality of the view toward the East Span, due to the increase in vividness (see Figure 4-8 in Appendix A). The signature structure would add landmark strength and distinctiveness. Vividness would increase the most with Replacement Alternatives S-4 and N-6, because the signature structure would be at a more favorable viewing angle (closer to 45 degrees) than Replacement Alternative N-2.

The signature bridge design variation would result in a minimally beneficial effect on visual quality of the overall view from the Oakland Touchdown area, due to an increase in vividness and unity (which are already at high levels) and the fact that the East Span occupies much of the larger view. There would be less of an increase in unity with Replacement Alternative S-4, because portions of the SFOBB West Span would become visually obstructed. Unity would increase more with the suspension bridge design variation, due to the visual similarity, prominence and shape compared with the SFOBB West Span and Golden Gate Bridge (which would be visible from the vantage point). Unity would increase less with the cable-stayed bridge design, because its shape does not echo the catenary forms of the SFOBB West Span.

Oakland-San Francisco Ferry.

Retrofit Existing Structure Alternative. The retrofit alternative would result in a negligible effect on visual quality. New support piers and other structural elements added as part of the Retrofit Alternative would decrease views beneath the East Span. However, views beneath the East Span would be constantly changing as the ferry continues its route, thereby minimizing the view obstruction created by the new piers and structural elements.

Skyway Design Variation. The skyway design variation would result in a minimally adverse effect on visual quality, due to the decrease in its vividness (see Figure 4-9 in Appendix A). While it would remain at a favorable viewing angle and would be relatively close, the simplicity of the skyway design variation would reduce the distinctive nature of the existing East Span. The reduction in the vividness would be less perceptible with Replacement Alternative S-4, because it is the closest Replacement Alternative to this viewpoint. Vividness would reduce the most with Replacement Alternative N-6.

Signature Bridge Design Variation. The signature bridge design variation would result in a minimally beneficial effect on the visual quality of the view toward the East Span, due to the increase in its vividness (see Figure 4-10 in Appendix A). The signature structure would add landmark strength and distinctiveness to the East Span. When comparing replacement alternatives, vividness would be most increased with Replacement Alternative S-4, because it is nearest to this viewpoint.

The signature bridge design variation would result in a minimally beneficial effect on the overall visual quality of the view toward the East Span, due to the increase in its unity and vividness. The close proximity and visual dominance of the East Span mean that changes to it would substantially affect the overall visual quality of the larger view. Unity would increase more with the suspension bridge design variation, due to the visual similarity, prominence and shape compared with the SFOBB West Span (which is visible from this viewpoint). With the cable-stayed bridge design variation, unity would increase over existing conditions but less than with the suspension bridge design variation, because its shape does not echo the catenary forms of the SFOBB West Span.

Treasure Island.

Retrofit Existing Structure Alternative. The retrofit alternative would result in a minimally adverse effect on visual quality. This effect is due to the increase in view obstruction from addition of shear walls on support structures under the bridge toward the City and Port of Oakland (see Figure 4-11 in Appendix A).

Skyway Design Variation. The skyway design variation would result in a minimally adverse effect on the visual quality of the view toward the East Span (see Figures 4-12 and 4-13 in Appendix A). With Replacement Alternative N-6, this decrease would be due to reduced vividness (these effects are somewhat offset by improved views over the East Span) and minor community disruption/privacy infringement issues because the replacement alternative would be closer to Treasure Island. With Replacement Alternative N-2, the reduction in visual quality would be due to the reduced vividness. With Replacement Alternative S-4, any reduction in visual quality would be due to reduced vividness and additional view obstruction caused by the way the piers would align. These effects are somewhat offset by a reduction in community disruption/privacy infringement because the East Span would be farther away.

The skyway design variations would result in a minimally adverse effect on the overall visual quality from Treasure Island. The close proximity and visual dominance of the East Span within the larger view mean that changes to it would substantially affect the overall visual quality. The reasons for the reduction in overall visual quality are the same as those cited in the preceding paragraph.

Signature Bridge Design Variation. The signature bridge design variation would result in a minimally beneficial effect on the visual quality of the view toward the East Span (see Figures 4-14 and 4-15 in Appendix A). With Replacement Alternative N-6, this effect would be due to the increase in the vividness of the East Span and the decrease in view obstruction (these effects are somewhat offset by the increase in community disruption/privacy infringement because it is closer to activities on Treasure Island). With Replacement Alternative N-2, this effect would be due to the increase in vividness. With Replacement Alternative S-4, this effect would be due to the increase in vividness and the reduction in community disruption/privacy infringement (these effects are somewhat offset by the increase in view obstruction).

The signature bridge design variation would result in a minimally beneficial effect on the overall visual quality from Treasure Island. Because the East Span occupies much of the larger view from this viewpoint, changes to it would have a substantial effect on the overall visual quality. As a result, there would be a minimally beneficial effect on overall visual quality from this viewpoint (see prior discussion).

4.3.4 Mitigation Measures

Impacts

All three replacement alternatives would require the removal of substantial amounts of woodland vegetation (approximately 325 to 364 trees from 15 centimeters to 1.8 meters [6 inches to 6 feet] in diameter) within the project's construction limits on YBI. A large grove of mature trees, primarily Eucalyptus, would be removed from the east-facing slopes of the island to accommodate any of the proposed replacement alternatives and associated detour spans. The average height of the trees is 12 meters (39 feet), and the visual effect of the trees is dramatic. They soften the island's appearance from a distance and screen a number of residences on the island.

All three replacement alternatives would require the removal of a number of trees within the project's construction limit on the Oakland Touchdown area. Replacement Alternatives N-6 and N-2 would necessitate the removal of 71 mature trees. Replacement Alternative S-4 would necessitate the removal of 12 mature trees.

The removal of this vegetation on both YBI and the Oakland Touchdown area would constitute a substantial visual impact, and a number of years would be required before the vegetation could reestablish itself to the density that exists today. The loss of this many trees would be highly noticeable during the construction period and subsequent years until the vegetation has reestablished itself. Views from the bridge as well as views from the East Bay would be affected by the removal of this vegetation. Table 4.3-1 includes the amount of total area disturbed and number of trees removed by alternative.

Mitigation. Mitigation for visual impacts associated with YBI will consist of development of a master planting plan developed in cooperation with local city agencies in accordance with the Treasure Island Draft Reuse Plan (TIDRP). It may not be appropriate, considering the fact that the eastern side of the island is expected to have a more urban character under the TIDRP, to simply replant the affected areas to replicate their former state. The TIDRP calls for the shorelines of TI and YBI to be more publicly oriented with garden parks along the shoreline. Mitigation will reflect this proposed new context.

Mitigation for visual impacts associated with the Oakland Touchdown area will consist of development of a master planting plan developed in cooperation with local city agencies. In addition, public access provided as mitigation for impacts associated with the Cypress Replacement Project (discussed in Section 6.7.1) will be included as part of this project.

Table 4.3-1 Tree Removal Impact Estimates

	Total Area Disturbed	Number of Trees Removed
Yerba Buena Island		
Alternative N-2		
Detour Options:		
North-North	9.6 hectares/23.7 acres	364
North-South	9.4 hectares/23.2 acres	350
Alternative N-6		
Detour Options		
North-North	10.6 hectares/26.2 acres	364
North-South	10.3 hectares/25.5 acres	350
Alternative S-4		
Detour Options		
North-South	9.4 hectares/23.2 acres	325
Oakland Touchdown Area		
Alternative N-2	3.8 hectares/9.4 acres	71
Alternative N-6	3.8 hectares/9.4 acres	71
Alternative S-4	5.5 hectares/13.6 acres	12

Source: Caltrans, August 1998.

Implementation of Mitigation Measures. A master plan and aesthetic guidelines for careful planning and development of the project's construction limit will be prepared by Caltrans in cooperation with the local city and county agencies and any community groups who have an interest in the project. Separate plans and guidelines will be developed for YBI and the Oakland Touchdown area.

4.4 AIR QUALITY

All the proposed alternatives would maintain five lanes of traffic in both directions on the East Span during and after construction and would not affect traffic volumes on or capacity of the bridge and adjacent freeways. As such, there should not be any change in air pollutant emissions due to any of the proposed alternatives compared to a No-Build condition.

However, a possible air quality issue does arise with the replacement alternatives, each of which includes a pedestrian/bicycle path. Users of a pedestrian/bicycle path would be located adjacent to the bridge roadway. A microscale carbon monoxide (CO) analysis was conducted to ensure that sufficient consideration was given to the preservation of air quality along areas of the bridge that might be used for a pedestrian/bicycle path.

This section considers the potential for exceeding state and federal ambient air quality standards for CO along the proposed pedestrian/bicycle path due to project operations. Short-term air quality impacts during construction are discussed in Section 4.14.

4.4.1 Methodology

A microscale dispersion analysis of CO emissions was performed using the EMFAC7F emission factor model[4] and CALINE4 dispersion model[5]. Traffic along a typical replacement structure was modeled under year 2005 conditions to determine CO concentrations 5.5 meters (18 feet) from the outside edge of the travel lanes, representing the center of a pedestrian/bicycle path. There would be no other public receptors in the immediate vicinity of the bridge span.

Background concentrations for the year 2005 were determined to be 1.9 parts per million (ppm) for one-hour average and 1.3 ppm for eight-hour average. These background concentrations were determined using Bay Area Air Quality Management District (BAAQMD) isopleth maps and rollback factors[6]. Isopleth maps are maps that show contour lines of carbon monoxide concentration. The contours are based on monitoring data and can be used to interpolate concentrations where there are no monitoring stations. Rollback factors are used to reduce current CO background levels as an estimate of future levels. It is assumed that CO levels will decline in the future because newer motor vehicles will have better emission controls.

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[4] A computer model developed by the California Air Resources Board to estimate composite on-road motor vehicle emission factors by vehicle class.

[5] A model developed by Caltrans that calculates carbon monoxide concentrations from motor vehicle uses.

[6] Bay Area Air Quality Management District, *BAAQMD CEQA Guidelines - Assessing the Air Quality Impacts of Projects and Plans*, April 1996.

4.4.2 Impacts

Worst-case one-hour and eight-hour average CO concentrations (project roadway contribution plus background concentration) predicted by the CALINE4 model are 2.7 ppm for a one-hour average and 1.9 ppm for an eight-hour average. These values are well below the federal and state standards. Federal one-hour and eight-hour standards are 35 ppm and 9 ppm, respectively. State standards are 20.0 ppm for one-hour and 9.0 ppm for eight-hour. In conclusion, neither state nor federal CO standards would be exceeded on the pedestrian/bicycle path regardless of location.

4.4.3 Air Quality Conformity

The East Span Project (as a retrofit project) is included in the Metropolitan Transportation Commission's (MTC) 1996 RTP and 1997 TIP. On September 30, 1996, the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) found these documents to conform to the State Implementation Plan (SIP). The East Span Project now includes consideration of a replacement bridge. A replacement bridge will have five lanes of traffic in each direction (the same as the existing bridge), so the project's design concept and scope have not changed from what is in the regional transportation plan (RTP) and transportation improvement program (TIP).

A microscale CO analysis was conducted for the project to determine project level conformity to the SIP as required by EPA's Transportation Conformity Rule. The analysis assumptions were developed in coordination with MTC and are consistent with assumptions used in the regional emissions analysis for the RTP and TIP for those inputs required in both analyses. The analysis shows that there are no CO violations expected in the project area. Since the Bay Area is not considered a federal PM_{10} non-attainment area, PM_{10} conformity requirements in the Transportation Conformity Rule are not applicable.

Based on the above information, it is concluded that the East Span Project is in conformity with the SIP.

4.5 NOISE AND VIBRATION

Traffic noise impacts are addressed under NEPA and Caltrans policies. Therefore, traffic noise impacts and abatement measures in the form of noise barriers have been analyzed and are presented in this section. Although noise abatement for impacted receptors can be achieved through the construction of noise barriers, their presence would conflict with maintaining the spirit and beauty of the proposed bridge design options on this unique project. It is therefore recommended that noise barriers not be constructed as part of the new East Span Project, unless there is overwhelming support from adjacent communities, other public agencies, and the public at large. What follows is an acoustical analysis describing traffic noise impacts and possible abatement measures.

4.5.1 Noise

The noise impact analysis involved modeling for future noise levels for the five alternatives (No-Build, Retrofit Existing Structure, and the N-2, N-6, and S-4 Replacement Alternatives). Potential impacts and noise abatement approaches have been assessed for each alternative for noise-sensitive uses on Yerba Buena Island (YBI), Treasure Island (TI), and the Oakland Touchdown area. The modeled peak-noise hour levels are shown in Table 4.5-1. A detailed noise impact assessment technical report has been prepared and is available for review at locations listed in the Preface.

In general, peak-noise-hour levels resulting from Replacement Alternatives N-2, N-6, and S-4 decrease by 1dBA to 10 dBA compared to the existing condition. The causes of the decrease in modeled noise levels for the future alignment scenarios are:

- Construction of the bridge using steel-reinforced concrete will result in lower operational noise levels by eliminating radiation of sound through the bridge decks and reducing noise created by vehicles traveling over expansion joints.[7]

- For the replacement alternatives, the eastbound and westbound lanes would be side by side rather than stacked, with the exception of the YBI viaduct and tunnel portal area. This will minimize the existing condition of traffic noise reflecting from the bottom of the upper deck.

Noise abatement measures are also discussed for each alternative. The need for noise abatement and the nature and form of noise abatement measures are important considerations for the East Span Project because of unique issues associated with its location. Noise abatement measures (e.g., construction of a noise barrier) are to be considered for reducing noise impacts when the predicted peak-noise-hour levels approach or exceed FHWA Noise Abatement Criteria (NAC) for appropriate land use categories (see Table 3.5-1). For this project, noise abatement measures were considered and evaluated for effectiveness based upon the FHWA NAC.

[7] Noise modeling assumptions for the Replacement Alternatives assume that the bridge structures would be constructed of concrete.

TABLE 4.5-1: SUMMARY OF UNABATED PEAK-NOISE HOUR LEVELS: EXISTING AND FUTURE

Location #	Location	Noise Receptor	Modeled Existing Noise Level L_{eq} (dBA)	Future No-Build Noise Level L_{eq} (dBA)	Seismic Retrofit Noise Level L_{eq} (dBA)	N2 Alignment Noise Level L_{eq} (dBA)	N6 Alignment Noise Level L_{eq} (dBA)	S4 Alignment Noise Level L_{eq} (dBA)
1	YBI: Houses north of bridge	1A	72	72	72	62	63	63
		1C	70	70	70	63	63	63
		1-LT	71	71	71	61	62	62
		1-M1	74	74	74	64	64	64
		1-M2	70	70	70	62	63	62
		1-M3	69	69	69	62	63	62
		1-M4	70	70	70	62	63	62
		1-M5	75	75	75	64	65	64
2	YBI: Housing north of bridge	2A	74	74	74	73	73	73
		2-M1	71	71	71	70	70	70
3	YBI: House north of bridge	3A	75	75	75	71	71	71
4	YBI: House south of bridge	4A	72	72	72	70	71	70
5	YBI: Houses south of bridge	5A	66	66	66	65	65	65
		5C	64	64	64	63	63	64
		5D	64	64	64	60	60	61
		5-M1	67	67	67	65	65	66
6	YBI: USCG apartments south of bridge and below	6A	72	72	72	62	62	62
		6C	71	71	71	61	61	62
		6-M1	72	72	72	62	62	62
		6-M2	72	72	72	61	62	62
7	YBI: USCG administration complex south of bridge and below	7A	69	69	69	60	60	61
		7-M1	71	71	71	61	61	62
9	YBI: Abandoned buildings north of bridge and below	9A	76	76	76	67	67	67
		9-M1	76	76	76	67	67	67
10	YBI: Building 262 north of bridge and below	10A	77	77	77	N/A*	65	65
		10-M1	77	77	77	N/A*	N/A*	66
11	YBI: USCG base outdoor recreation area south of bridge and below	11A	75	75	75	64	64	64
		11C	77	77	77	68	68	N/A*
		11-M1	77	77	77	68	68	N/A*
		11-M2	77	77	77	69	69	69
		11-M3	77	77	77	69	69	N/A*
12	OT: Proposed Park Distr. Shoreline public access are north of bridge	12A	72	72	72	N/A*	N/A*	68
		12-M1	71	71	71	N/A*	N/A*	67
		12-M2	74	74	74	N/A*	N/A*	71
		12-LT	73	73	73	N/A*	N/A*	70
13	OT: Proposed Park Distr. Shoreline public access are south of bridge	13A	73	73	73	67	67	68
		13C	74	74	74	70	70	N/A*
		13-M1	73	73	73	67	67	N/A*
		13-M2	71	71	71	68	68	N/A*
		13-M3	71	71	71	68	68	72
17	OT: Radio Point Beach shoreline access, wildlife habitat north of bridge	17A	66	66	66	69	69	69
		17-M1	70	70	70	73	72	73
18	OT: Shoreline south of bridge	18A	69	69	69	71	70	72
		18-M1	66	66	66	68	68	69
		18-M2	65	65	65	67	67	67
20	YBI: Navy Parade Grounds north of bridge and below	20A	72	72	72	62	62	63
		20-M1	72	72	72	62	62	63
21	YBI: Cleared area north of bridge and below	21A	74	74	74	60	60	62
		21-M1	73	73	73	60	60	62
		21-M2	73	73	73	60	60	62
		21-M3	73	73	73	59	59	61
TI	TI	STUDIO	67	67	67	59	59	58

Note: YBI = Yerba Buena Island; OT = Oakland Touchdown Area; TI = Treasure Island
*** - This alternative would place the bridge above or on top of this location.**

Noise abatement consisted of determining the acoustical effectiveness of noise barriers. Noise barriers must reduce future predicted noise levels at impacted receptors by at least five dBA to be considered feasible. The feasibility criterion is not necessarily a noise abatement design goal. Greater noise reductions are encouraged if they can be reasonably achieved. Feasibility may be restricted by topography, access requirements for ramps, other noise sources in the area and safety considerations. Reasonableness of noise barriers must be evaluated as well and includes such additional factors as cost per benefited residence, absolute noise levels, change in noise levels, viewshed preservation, appearance, views of impacted residents, input from other agencies, and other social, economic, environmental, legal and technological factors. Noise insulation of residential dwellings is typically only considered when severe traffic noise impacts are predicted and normal abatement measures are not physically feasible or economically reasonable. When considering extraordinary abatement measures, it must be demonstrated that the affected activities experience traffic noise impacts to a far greater degree than other similar activities adjacent to highway facilities; i.e., private residential dwelling units will have after project implementation or noise levels of 75 dBA, $L_{eq}^{(h)}$, or more, or the project causes a noise level increase of 30 dBA or more over predicted noise levels if no project was constructed. Because substantial noise impacts are not predicted for any project of the alternatives, noise insulation of structures was not considered.

The effectiveness of a range of soundwall heights from 1.8 to 4.9 meters (6 to 16 feet) was tested using the criteria of reducing noise levels a minimum of five dBA at the receiver. In addition, for a soundwall to be considered effective, it must interrupt the line of sight between the receiver (assumed to be 1.5 meters [5 feet] tall) and an exhaust stack of a heavy-duty truck. The truck-stack height is considered to be 3.5 meters (11.5 feet) above the roadway surface. If soundwalls are installed, they should be constructed along the outer edges of the bridge decks for maximum noise abatement effectiveness.

Impacts

This section describes expected changes in noise levels for the project alternatives. Receptor locations are shown on Figures 3-12, 3-13, and 3-14 in Appendix A.

No-Build Alternative and Retrofit Existing Structure Alternative. The No-Build Alternative and the Retrofit Existing Structure Alternative will not result in any increase in traffic capacity, any change in geometry, or any change in traffic speeds. Noise levels under these alternatives would remain unchanged from existing peak-noise hour levels. Therefore, no requirement exists for a noise assessment of the No-Build Alternative and the Retrofit Existing Structure Alternative.

Replacement Alternative N-2. Replacement Alternative N-2 would lie to the north of the existing East Span alignment and transition from the retrofitted double-deck viaduct to two parallel structures over YBI. Generally, noise levels would decrease by 1 to 14 decibels, compared to the existing, No-Build, and Retrofit Existing Structure Alternatives, resulting in many of the receptors experiencing future noise levels below FHWA NAC. This would eliminate the need for noise abatement at these locations.

Yerba Buena Island. As shown in Table 4.5-1, peak-noise-hour levels under the Replacement Alternative N-2 produce the greatest noise level difference compared to the current bridge structure at receptor locations 1, 6, 7, 20, and 21, where the peak-noise-hour levels would be 10 to 14 dBA quieter. The noise levels at Locations 1, 5, 6, 7, 20, and 21 are below the FHWA NAC for Activity Category B land uses of 67 dBA L_{eq} under Replacement Alternative N-2. The noise levels at Locations 2, 3, 4, 9, and 11 would have noise levels which equal or exceed the 67 dBA L_{eq} standard.

At Location 7, the peak-noise-hour levels are 60 and 61 dBA L_{eq}, which are below the FHWA NAC of 72 dBA for this activity category.

For the Replacement Alternative N-2, locations on YBI exceed the FHWA NAC based on existing land uses as well as existing and future predicted noise levels and, therefore, noise abatement measures are considered. Practical noise measures that effectively reduce these modeled noise levels consist of barriers, due to the limitations of other abatement measures for bridge structures. Installation of the barriers summarized below would result in soundwalls extending along both sides of the existing bridge structure wherever I-80 is over land on YBI. The location of soundwalls required to reduce noise levels by 5 dB or more and break truck-stack line-of-sight are summarized below and presented in Table 4.5-2. (See Figure 4-16 in Appendix A for potential soundwall locations for Alternative N-2.)

Although soundwalls are the most reliable and commonly accepted method of reducing roadway or bridge-generated noise levels, other approaches to noise abatement will be investigated during final design of the selected alternative. Noise abatement approaches that would not restrict views of bridge users or detract from bridge aesthetics will be considered by Caltrans for effectiveness during final design of the selected alternative (see Abatement Options for Noise Abatement Materials and Treatment section following).

Treasure Island. Replacement Alternative N-2 peak-noise-hour noise level at the film studio on TI is predicted to be 59 dBA L_{eq}, a decrease of 8 dB compared with existing, No-Build, or Retrofit Existing Structure Alternatives. This level would be below the NAC for Activity Category C (commercial uses) of 72 dBA L_{eq}.

Oakland Touchdown Area. Noise levels under Replacement Alternative N-2 are predicted to vary from 67 dBA L_{eq} to 73 dBA L_{eq}. Two of the ten modeled receptors for Replacement Alternative N-2 (Receptors 17-M1 and 18-A) in the Oakland Touchdown area have peak-noise-hour levels which approach or exceed the FHWA NAC for Activity Category C of 72 dBA L_{eq}. However, there are no exterior areas of frequent human use for which lower noise levels would be of benefit.

TABLE 4.5-2: SUMMARY OF PEAK-NOISE-HOUR NOISE LEVELS: EXISTING AND FUTURE N2

Location #	Noise Receptor	Modeled Existing Noise Level L_{eq} (dBA)	Future - N2 Alignment Noise Level L_{eq} (dBA)	Soundwall Number and Begin/End Stations	Soundwall Placement	Soundwall Height (meters)**	Predicted Noise Levels: Future with Soundwall L_{eq} (dBA)						Wall Ht. Required to Break L-O-S (m)**
							1.83m**	2.44m**	3.05m**	3.66m**	4.27m**	4.88m**	
1	1A	72	62	N/A	N/A	None							
	1C	70	63	N/A	N/A	None							
	1-LT	71	61	N/A	N/A	None							
	1-M1	74	64	N/A	N/A	None							
	1-M2	70	62	N/A	N/A	None							
	1-M3	69	62	N/A	N/A	None							
	1-M4	70	62	N/A	N/A	None							
	1-M5	75	64	N/A	N/A	None							
2	2A	74	73	SW 1A,1B (2)	E/B	4.27	72	70	69	67	66	65	4.2
	2-M1	71	70	SW 1A,1B (2)	E/B	4.27	69	67	66	65	63	62	4.0
3	3A	75	71	SW 2A,2B (1)	E/B	3.05	68	66	65	63	62	61	3.0
4	4A	72	70	SW 3A, 3B (2)	E/B	3.66	68	67	65	64	62	61	3.3
5	5A	66	65	N/A	N/A	None							
	5C	64	63	N/A	N/A	None							
	5D	64	60	N/A	N/A	None							
	5-M1	67	65	N/A	N/A	None							
6	6A	72	62	N/A	N/A	None							
	6C	71	61	N/A	N/A	None							
	6-M1	72	62	N/A	N/A	None							
	6-M2	72	61	N/A	N/A	None							
7	7A	69	60	N/A	N/A	None							
	7-M1	71	61	N/A	N/A	None							
9	9A	76	67*	N/A	N/A	None							
	9-M1	76	67*	N/A	N/A	None							
10	10A	77	N/A*	N/A	N/A	None							
	10-M1	77	N/A*	N/A	N/A	None							

E/B = EDGE OF BRIDGE DECK
N/A = NOT APPLICABLE: NOISE LEVELS EITHER BELOW NOISE ABATEMENT CRITERIA OR MODELING DATA INDICATES THAT A SOUNDWALL WOULD BE INEFFECTIVE
SOUNDWALL STATIONING:
(1) = 52+00 TO 53+40
(2) = 49+55 TO 52+00

*** - THIS ALTERNATIVE WOULD PLACE THE BRIDGE ABOVE OR ON TOP OF THIS LOCATION; SOUNDWALL INEFFECTIVE.**
**** - TO CONVERT TO ENGLISH UNITS, DIVIDE BY 0.3048.**

TABLE 4.5-2: SUMMARY OF PEAK-NOISE-HOUR NOISE LEVELS: EXISTING AND FUTURE N2 (Continued)

Location #	Noise Receptor	Modeled Existing Noise Level L_{eq} (dBA)	Future - N2 Alignment Noise Level L_{eq} (dBA)	Soundwall Number and Begin/End Stations	Soundwall Placement	Soundwall Height (meters)**	Predicted Noise Levels: Future with Soundwall L_{eq} (dBA)						Wall Ht. Required to Break L-O-S (m)**
							1.83m**	2.44m**	3.05m**	3.66m**	4.27m**	4.88m**	
11	11A	75	64	N/A	N/A	None							
	11C	77	68*	N/A	N/A	None							
	11-M1	77	68*	N/A	N/A	None							
	11-M2	77	69*	N/A	N/A	None							
	11-M3	77	69*	N/A	N/A	None							
12	12A	72	N/A*	N/A	N/A	None							
	12-M1	71	N/A*	N/A	N/A	None							
	12-M2	74	N/A*	N/A	N/A	None							
	12-LT	73	N/A*	N/A	N/A	None							
13	13A	73	67	N/A	N/A	None	65	64	63	61	60	59	2.2
	13C	74	70	N/A	N/A	None	68	67	65	64	62	61	3.1
	13-M1	73	67	N/A	N/A	None	65	64	63	62	60	59	3.2
	13-M2	71	68	N/A	N/A	None	66	65	64	62	61	60	3.4
	13-M3	71	68	N/A	N/A	None	67	66	64	63	62	60	3.4
17	17A	66	69	N/A	N/A	None	67	66	65	63	62	61	3.3
	17-M1	70	73	N/A	N/A	None	70	69	68	66	65	63	3.2
18	18A	69	71	N/A	N/A	None	69	68	66	65	64	62	3.3
	18-M1	66	68	N/A	N/A	None	66	65	64	63	62	60	3.4
	18-M2	65	67	N/A	N/A	None	65	64	63	62	61	59	3.4
20	20A	72	62	N/A	N/A	None							
	20-M1	72	62	N/A	N/A	None							
21	21A	74	60	N/A	N/A	None							
	21-M1	73	60	N/A	N/A	None							
	21-M2	73	60	N/A	N/A	None							
	21-M3	73	59	N/A	N/A	None							
	STUDIO	67	59	N/A	N/A	None							

E/B = EDGE OF BRIDGE DECK
N/A = NOT APPLICABLE: NOISE LEVELS EITHER BELOW NOISE ABATEMENT CRITERIA OR MODELING DATA INDICATES THAT A SOUNDWALL WOULD BE INEFFECTIVE
SOUNDWALL STATIONING:
(1) = 52+00 TO 53+40
(2) = 49+55 TO 52+00

*** - THIS ALTERNATIVE WOULD PLACE THE BRIDGE ABOVE OR ON TOP OF THIS LOCATION; SOUNDWALL INEFFECTIVE.**
**** - TO CONVERT TO ENGLISH UNITS, DIVIDE BY 0.3048.**

Abatement for Replacement Alternative N-2.

Yerba Buena Island. On the northern side of the bridge, two 4.27-meter (14-foot) high walls 245 meters (800 feet) long at each of the bridge decks exiting YBI would reduce noise levels 5 dBA or more and break truck-stack line-of-sight. Together, the walls would provide effective noise reduction for approximately 90 presently unoccupied residential units at Location 2. Both the U.S. Navy and the City and County of San Francisco have expressed their desire to rent out these unoccupied residential units on YBI. From Station 52+40 to Station 53+40 SW-2A and SW-2B would be 3.05 meters (10 feet) high, with a 3.66 meter (12 foot) transition area from Station 52+00 to Station 52+40. The soundwalls would need to be approximately 140 meters (459 feet) in length to provide effective noise reduction to the one residence at Location 3. On the south side of the bridge, walls 3.66 meters (12 feet) in height on both bridge decks exiting the tunnel would reduce noise levels 5 dB or more and break truck-stack line-of-sight. These walls would extend for 245 meters (800 feet) to the east of the tunnel portal. These walls would provide noise reduction for the one residence at Location 4.

Replacement Alternative N-6. Generally, noise levels resulting from Replacement Alternative N-6 decrease by 1 dBA to 14 dBA compared to the existing bridge. The lower noise levels are less than the FHWA NAC at many receptors, thus eliminating the need for abatement at these locations.

Yerba Buena Island. As shown in Table 4.5-1, peak-noise-hour levels for Replacement Alternative N-6 produce the largest difference (in terms of noise levels) compared to the existing structure for receptor Locations 1, 6, 7, 20, and 21, where the peak-noise-hour levels would be 10-14 dBA quieter. The noise levels at Locations 1, 5, 6, 20, and 21 are below the FHWA NAC for Activity Category B land uses of 67 dBA L_{eq}. The noise levels at Locations 2, 3, 4, and 9 would have noise levels which equal or exceed the 67 dBA L_{eq} criteria.

With Replacement Alternative N-6, the peak-noise-hour levels at Location 7 are 60 and 61 dBA L_{eq}, which are below the FHWA NAC for this Activity Category C land use.

Treasure Island. Replacement Alternative N-6 peak-noise-hour noise level at the film studio on TI is predicted to be 59 dBA L_{eq}, a decrease of 8 dB compared with the existing condition. The traffic noise associated with Replacement Alternative N-6 would be below the NAC for Activity Category C (commercial uses) of 72 dBA L_{eq}.

Oakland Touchdown Area. As shown in Table 4.5-1, one of the ten modeled receptors for Replacement Alternative N-6 (Receptor 17-M1) in the Oakland Touchdown area has peak-noise-hour levels which exceed the FHWA NAC for Activity Category C of 72 dBA L_{eq}. However, there are no exterior areas of frequent human use for which lower noise levels would be of benefit.

Abatement for Replacement Alternative N-6.

Yerba Buena Island. On the northern side of the bridge, two 4.27-meter (14-foot) high walls 245 meters (800 feet) long at each of the bridge decks exiting YBI would

reduce noise levels 5 dB or more and break truck-stack line-of-sight. Together, the walls would provide effective noise reduction for approximately 90 occupied residential units at Location 2. These walls would transition to 3.66 meters (12 feet) in height for 140 meters (460 feet) in length and would provide noise reduction for the one residence at Location 3. On the south side of the bridge, walls 3.66 meters (12 feet) in height on both bridge decks exiting the tunnel would reduce noise levels 5 dB or more and break truck-stack line-of-sight. These walls would extend for 245 meters (800 feet) to the east of the tunnel portal. These walls would provide noise reduction for the one residence at Location 4. (See Table 4.5-3 in this section and Figure 4-17 in Appendix A for potential soundwall locations for Alternative N-6.)

Replacement Alternative S-4. Noise levels resulting from Replacement Alternative S-4 would be similar to those from Alternatives N-2 and N-6, differing by less than one to two decibels. Generally, noise levels resulting from Replacement Alternative S-4 decrease by 1 dBA to 14 dBA compared to the existing condition. The noise level decreases associated with this alternative cause many of the receptors to be below the FHWA NAC.

Yerba Buena Island. As shown in Table 4.5-1, the noise levels at Locations 1, 5, 6, 7, 9, 20, and 21 meet the FHWA NAC for Activity Category B land uses of 67 dBA L_{eq} under Replacement Alternative S-4.

At Location 7, the peak-noise-hour levels would be 61 dBA L_{eq}, which is below the FHWA NAC of 72 dBA for Activity Category C.

Treasure Island. The Replacement Alternative S-4 peak-noise-hour level at the studio on TI is predicted to be 59 dBA L_{eq}, a decrease of 8 dB compared to the existing condition. As with Alternatives N-2 and N-6, the traffic noise associated with the Alternative S-4 would be below the NAC for Activity Category C, which is 72 dBA L_{eq}.

Oakland Touchdown Area. Four of the ten modeled receptors in the Oakland Touchdown area (Receptors 12-M2, 13-M3, 17-M1, and 18-A) have peak-noise-hour levels which approach or exceed the FHWA NAC for Activity Category C of 72 dBA L_{eq} under this alternative. However, there are no exterior areas of frequent human use for which lower noise levels would be of benefit.

Abatement for Replacement Alternative S-4.

Yerba Buena Island. Soundwalls which would reduce noise levels 5 dB or more and break truck-stack line-of-sight at YBI are the same for Replacement Alternative S-4 as for Replacement Alternative N-2. (See Table 4.5-4 in this section and Figure 4-18 in Appendix A for recommended soundwall locations for Replacement Alternative S-4.)

Options for Noise Abatement Materials and Treatment. Options for abating noise by using different barrier materials, tunnel portal treatments, and roadway pavement materials were reviewed for the East Span Project. These options

TABLE 4.5-3: SUMMARY OF PEAK-NOISE-HOUR NOISE LEVELS: EXISTING AND FUTURE N6

Location #	Noise Receptor	Modeled Existing Noise Level L_{eq} (dBA)	Future - N6 Alignment Noise Level L_{eq} (dBA)	Soundwall Number and Begin/End Stations	Soundwall Placement	Soundwall Height (meters)**	Predicted Noise Levels: Future with Soundwall L_{eq} (dBA)						Wall Ht. Required to Break L-O-S (m)**
							1.83m**	2.44m**	3.05m**	3.66m**	4.27m**	4.88m**	
1	1A	72	63	N/A	N/A	None							
	1C	70	63	N/A	N/A	None							
	1-LT	71	62	N/A	N/A	None							
	1-M1	74	64	N/A	N/A	None							
	1-M2	70	63	N/A	N/A	None							
	1-M3	69	63	N/A	N/A	None							
	1-M4	70	63	N/A	N/A	None							
	1-M5	75	65	N/A	N/A	None							
2	2A	74	73	SW 1A,1B (2)	E/B	4.27	72	71	69	68	67	65	4.2
	2-M1	71	70	SW 1A,1B (2)	E/B	4.27	69	68	66	65	64	63	4.0
3	3A	75	71	SW 2A,2B (1)	E/B	3.66	68	67	65	64	63	62	3.2
4	4A	72	71	SW 3A, 3B (2)	E/B	3.66	68	67	66	64	63	61	3.5
5	5A	66	65	N/A	N/A	None							
	5C	64	63	N/A	N/A	None							
	5D	64	60	N/A	N/A	None							
	5-M1	67	65	N/A	N/A	None							
6	6A	72	62	N/A	N/A	None							
	6C	71	61	N/A	N/A	None							
	6-M1	72	62	N/A	N/A	None							
	6-M2	72	62	N/A	N/A	None							
7	7A	69	60	N/A	N/A	None							
	7-M1	71	61	N/A	N/A	None							
9	9A	76	67*	N/A	N/A	None							
	9-M1	76	67*	N/A	N/A	None							

E/B = EDGE OF BRIDGE DECK
N/A = NOT APPLICABLE: NOISE LEVELS EITHER BELOW NOISE ABATEMENT CRITERIA OR MODELING DATA INDICATES THAT A SOUNDWALL WOULD BE INEFFECTIVE
SOUNDWALL STATIONING:
(1) = 52+00 TO 53+40
(2) = 49+55 TO 52+00

*** - THIS ALTERNATIVE WOULD PLACE THE BRIDGE ABOVE OR ON TOP OF THIS LOCATION; SOUNDWALL INEFFECTIVE.**
**** - TO CONVERT TO ENGLISH UNITS, DIVIDE BY 0.3048.**

TABLE 4.5-3: SUMMARY OF PEAK-NOISE-HOUR NOISE LEVELS: EXISTING AND FUTURE N6 (Continued)

Location #	Noise Receptor	Modeled Existing Noise Level L_{eq} (dBA)	Future - N6 Alignment Noise Level L_{eq} (dBA)	Soundwall Number and Begin/End Stations	Soundwall Placement	Soundwall Height (meters)**	Predicted Noise Levels: Future with Soundwall L_{eq} (dBA)						Wall Ht. Required to Break L-O-S (m)**
							1.83m**	2.44m**	3.05m**	3.66m**	4.27m**	4.88m**	
10	10A	77	65	N/A	N/A	None							
	10-M1	77	N/A*	N/A	N/A	None							
11	11A	75	64	N/A	N/A	None							
	11C	77	68*	N/A	N/A	None							
	11-M1	77	68*	N/A	N/A	None							
	11-M2	77	69*	N/A	N/A	None							
	11-M3	77	69*	N/A	N/A	None							
12	12A	72	N/A*	N/A	N/A	None							
	12-M1	71	N/A*	N/A	N/A	None							
	12-M2	74	N/A*	N/A	N/A	None							
	12-LT	73	N/A*	N/A	N/A	None							
13	13A	73	67	N/A	N/A	None	65	64	63	61	60	59	3.0
	13C	74	70	N/A	N/A	None	68	66	65	63	62	61	3.0
	13-M1	73	67	N/A	N/A	None	65	64	63	61	60	59	3.1
	13-M2	71	68	N/A	N/A	None	66	65	64	62	61	60	3.3
	13-M3	71	68	N/A	N/A	None	66	65	64	63	61	60	3.3
17	17A	66	69	N/A	N/A	None	67	66	65	63	62	61	3.4
	17-M1	70	72	N/A	N/A	None	70	69	68	66	65	63	3.3
18	18A	69	70	N/A	N/A	None	68	67	66	64	63	62	3.2
	18-M1	66	68	N/A	N/A	None	66	65	64	62	61	60	3.3
	18-M2	65	67	N/A	N/A	None	65	64	63	61	60	59	4.1
20	20A	72	62	N/A	N/A	None							
	20-M1	72	62	N/A	N/A	None							
21	21A	74	60	N/A	N/A	None							
	21-M1	73	60	N/A	N/A	None							
	21-M2	73	60	N/A	N/A	None							
	21-M3	73	59	N/A	N/A	None							
	STUDIO	67	59	N/A	N/A	None							

E/B = EDGE OF BRIDGE DECK
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SOUNDWALL STATIONING:
(1) = 52+00 TO 53+40
(2) = 49+55 TO 52+00

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and their potential effectiveness are summarized below. Selection of barrier materials would be subject to evaluation of a number of factors in addition to their effectiveness in providing noise abatement. Additional factors include maintenance requirements, expected period of serviceability and life-cycle costs.

Standard Soundwall. Examples of standard materials are masonry block and precast concrete. Generally the heaviest barrier per unit dimension, it requires a slightly more massive supporting structure; the reverberant soundfield may increase noise level between closely spaced parallel soundwalls; it has potential for reflecting traffic noise into adjacent areas that are located nearby, above, and opposite from the soundwall; it is not visually transparent.

Acoustically Absorptive Soundwall. Multiple reflections between parallel barriers can potentially reduce the acoustical performance of each individual barrier. When designing reflective parallel noise barriers, it is recommended that a minimum 10:1 ratio is maintained between two barriers, in order to avoid the possibility of perceivable barrier performance degradations. If that is not possible, acoustically absorptive barriers may have to be considered. The recommended aspect ratio (10:1 or greater) could be achieved for this project and, therefore, no further noise abatement in the form of acoustically absorptive barriers would be required.

Viewshed Soundwall. These soundwalls are visually transparent noise barriers; alternative material is glass; acoustical performance equivalent to standard reflective soundwalls; substantially lighter weight per unit area than standard masonry soundwall material; reverberant soundfield may increase noise level between parallel soundwalls; has potential for reflecting traffic noise into adjacent areas that are located nearby, above, and opposite from the soundwall; panel sections designed to be readily disassembled and replaced without affecting adjacent sections or losing acoustical performance; newer generation of materials are non-yellowing/glazing to maintain visual transparency; the vertical (and optionally) horizontal framing and supporting structures are fabricated of solid material that is not transparent.

Combination Viewshed/Acoustically-absorptive Soundwall. The metal sandwich type of transportation noise panel system has provision for intermixing transparent view panels with the visually opaque, acoustically absorptive panels. The see-through panels may be inserted below, between, and/or above the solid panels. Depending on the specific combination and placement of panel types, the acoustic characteristics of the combination soundwall will be more or less similar to reflective or absorptive soundwalls; substantially lighter weight per unit area than standard masonry soundwall material; panel sections designed to be readily disassembled and replaced without affecting adjacent sections, or changing acoustical performance and visual characteristics.

Reduced Noise Pavement Surfaces. Non-standard pavement surfaces have been alleged to reduce traffic noise. The most common pavement types referred to for this effect are "open graded" asphalt concrete and "rubberized" asphalt. Although the non-acoustic properties of these pavement types are documented and standard specifications for their use are available, their benefits in noise reduction are only recently being published, with scientific research by Caltrans in process. Recently released data

(Wayson, R.L., July 1998) concluded that dense asphalt is approximately 3 dBA quieter than PCC with new open graded asphalt providing an additional 1.5 dBA lower noise level. However, the data suggests that open graded noise levels will be similar to dense graded material after some years of wear. Rubberized binder asphalt may reduce pavement noise levels by approximately three decibels; however sufficient study data is not currently available to support firm conclusions. Another study (Bajdek, C., 1998) found that noise levels from open graded asphalt were approximately five decibels lower than for grooved PCC. These pavement types should be considered for use on the SFOBB project, but their noise abatement abilities must be considered along with other factors (such as life cycle cost) important to pavement type selection.

Tunnel Portal Acoustic Treatment. Noise levels in the immediate vicinity of traffic tunnel portals are noted to be higher than at some distance from the portals. Placement of acoustically absorptive materials inside the portals has resulted in reduction of higher noise levels experienced outside the portal.[8] According to the literature, however, the benefits of tunnel portal treatment diminish substantially at distances of approximately 100 meters (328 feet). Because the nearest noise-sensitive receptors are approximately 100 meters away from the tunnel portal, the benefits of acoustic treatment of the tunnel portal for this project would likely be marginal.

4.5.2 Vibration

As noted in the affected environment section, existing vibration levels from traffic operations (i.e., heavy-truck traffic) were below the levels of human perception at distances of more than 20 meters (65 feet) from the bridge support columns where ground-borne measurements were performed. Future operations vibration levels at nearby locations are predicted to remain below perception and criterion levels for any of the project alternatives, and would be even lower for the replacement bridge alternatives that are constructed of higher-mass concrete[9].

[8] NCEJ, Institute of Noise Control Engineering of the USA, *Sound Propagation at Tunnel Openings*, September-October 1992.

[9] Vibration analysis assumptions for the replacement alternatives assume that the structures would be constructed of concrete.

TABLE 4.5-4: SUMMARY OF PEAK-NOISE-HOUR NOISE LEVELS: EXISTING AND FUTURE S4

Location #	Noise Receptor	Modeled Existing Noise Level L_{eq} (dBA)	Future - S4 Alignment Noise Level L_{eq} (dBA)	Soundwall Number and Begin/End Stations	Soundwall Placement	Soundwall Height (meters)**	Predicted Noise Levels: Future with Soundwall L_{eq} (dBA)						Wall Ht. Required to Break L-O-S (m)**
							1.83m**	2.44m**	3.05m**	3.66m**	4.27m**	4.88m**	
1	1A	72	63	N/A	N/A	None							
	1C	70	63	N/A	N/A	None							
	1-LT	71	62	N/A	N/A	None							
	1-M1	74	64	N/A	N/A	None							
	1-M2	70	62	N/A	N/A	None							
	1-M3	69	62	N/A	N/A	None							
	1-M4	70	62	N/A	N/A	None							
	1-M5	75	64	N/A	N/A	None							
2	2A	74	73	SW 1A,1B (2)	E/B	4.27	71	70	69	68	67	66	4.2
	2-M1	71	70	SW 1A,1B (2)	E/B	4.27	69	67	66	65	64	63	4.0
3	3A	75	71	SW 2A,2B (1)	E/B	3.66	68	67	65	64	63	61	3.2
4	4A	72	70	SW 3A, 3B (2)	E/B	3.66	68	67	66	65	63	62	3.5
5	5A	66	65	N/A	N/A	None							
	5C	64	64	N/A	N/A	None							
	5D	64	61	N/A	N/A	None							
	5-M1	67	66	N/A	N/A	None							
6	6A	72	62	N/A	N/A	None							
	6C	71	62	N/A	N/A	None							
	6-M1	72	62	N/A	N/A	None							
	6-M2	72	62	N/A	N/A	None							
7	7A	69	61	N/A	N/A	None							
	7-M1	71	62	N/A	N/A	None							
9	9A	76	67	N/A	N/A	None							
	9-M1	76	67	N/A	N/A	None							
10	10A	77	65	N/A	N/A	None							
	10-M1	77	66	N/A	N/A	None							

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N/A = NOT APPLICABLE: NOISE LEVELS EITHER BELOW NOISE ABATEMENT CRITERIA OR MODELING DATA INDICATES THAT A SOUNDWALL WOULD BE INEFFECTIVE
SOUNDWALL STATIONING:
(1) = 52+00 TO 53+40
(2) = 49+55 TO 52+00
*** - THIS ALTERNATIVE WOULD PLACE THE BRIDGE ABOVE OR ON TOP OF THIS LOCATION; SOUNDWALL INEFFECTIVE.**
**** - TO CONVERT TO ENGLISH UNITS, DIVIDE BY 0.3048.**

TABLE 4.5-4: SUMMARY OF PEAK-NOISE-HOUR NOISE LEVELS: EXISTING AND FUTURE S4 (Continued)

Location #	Noise Receptor	Modeled Existing Noise Level L_{eq} (dBA)	Future - S4 Alignment Noise Level L_{eq} (dBA)	Soundwall Number and Begin/End Stations	Soundwall Placement	Soundwall Height (meters)**	Predicted Noise Levels: Future with Soundwall L_{eq} (dBA)						Wall Ht. Required to Break L-O-S (m)**
							1.83m**	2.44m**	3.05m**	3.66m**	4.27m**	4.88m**	
11	11A	75	64	N/A	N/A	None							
	11C	77	N/A*	N/A	N/A	None							
	11-M1	77	N/A*	N/A	N/A	None							
	11-M2	77	69	N/A	N/A	None							
	11-M3	77	N/A*	N/A	N/A	None							
12	12A	72	68	N/A	N/A	None							
	12-M1	71	67	N/A	N/A	None							
	12-M2	74	71	N/A	N/A	None							
	12-LT	73	70	N/A	N/A	None							
13	13A	73	68	N/A	N/A	None	66	65	64	64	63	63	2.1
	13C	74	N/A*	N/A	N/A	None							
	13-M1	73	N/A*	N/A	N/A	None							
	13-M2	71	N/A*	N/A	N/A	None							
	13-M3	71	72	N/A	N/A	None	69	68	67	65	64	63	3.1
17	17A	66	69	N/A	N/A	None	68	66	65	64	62	61	3.3
	17-M1	70	73	N/A	N/A	None	71	69	68	66	65	64	3.3
18	18A	69	72	N/A	N/A	None	70	68	67	66	64	63	3.3
	18-M1	66	69	N/A	N/A	None	67	66	65	63	62	61	3.4
	18-M2	65	67	N/A	N/A	None	66	65	63	62	61	59	3.4
20	20A	72	63	N/A	N/A	None							
	20-M1	72	63	N/A	N/A	None							
21	21A	74	62	N/A	N/A	None							
	21-M1	73	62	N/A	N/A	None							
	21-M2	73	62	N/A	N/A	None							
	21-M3	73	61	N/A	N/A	None							
	STUDIO	67	58	N/A	N/A	None							

E/B = EDGE OF BRIDGE DECK

N/A = NOT APPLICABLE: NOISE LEVELS EITHER BELOW NOISE ABATEMENT CRITERIA OR MODELING DATA INDICATES THAT A SOUNDWALL WOULD BE INEFFECTIVE

SOUNDWALL STATIONING:

(1) = 52+00 TO 53+40

(2) = 49+55 TO 52+00

*** - THIS ALTERNATIVE WOULD PLACE THE BRIDGE ABOVE OR ON TOP OF THIS LOCATION; SOUNDWALL INEFFECTIVE.**

**** - TO CONVERT TO ENGLISH UNITS, DIVIDE BY 0.3048.**

4.6 HAZARDOUS WASTES

Hazardous and petroleum materials have the potential to adversely affect human health and the environment. The design, construction, and operation of the East Span Project could potentially increase the risk of adverse effects associated with hazardous and petroleum materials present within or near the construction footprint of the alternatives and the project area.

A Hazardous Wastes Assessment report has been prepared for the East Span Project and is available for review at the locations identified in the Preface.

4.6.1 Right-of-Way Acquisition Impacts

Environmental liabilities may be associated with the acquisition of contaminated properties.

CERCLA can hold past and present owners of real property liable for the costs of site investigations and remediation (see Section 3.6.1). CERCLA provides a defense to this liability (the "innocent landowner" defense) if the owner or operator, prior to acquisition of the property, conducted all appropriate inquiry into the condition of the property ("due diligence" investigation). Where appropriate inquiry reveals no contamination at the time of acquisition, but contamination is later discovered, the purchaser could be released from liability.

4.6.2 Summary and Comparison of Alternatives

Tables 4.6-1 and 4.6-2 and the following subsections summarize and compare potential impacts by alternative for the YBI and Oakland Touchdown areas, including detour options. The discussion focuses on potentially contaminated sites discussed in Section 3.6 and identified on Figures 3-15a and 3-15b in Appendix A.

Yerba Buena Island

No-Build Alternative. There are no impacts associated with the No-Build Alternative.

Retrofit Existing Structure Alternative. The Retrofit Existing Structure Alternative will likely affect the following sites:

- Installation Remediation (IR) Site 29, East Side Contaminated Bridge Soils - During retrofitting of the existing bents and columns, workers may encounter soils contaminated by metals associated with past bridge maintenance and operations and also by petroleum hydrocarbons.

- IR Site 8, Former Army Point Sludge Disposal Area - During retrofitting activities, exposure pathways to metals (especially beryllium and lead) due to heavy

Table 4.6-1 Comparison of Alternatives: Contaminated Sites

	Alternatives				
Impact Sites	**No-Build**	**Retrofit**	**Alt. N-2**	**Alt. N-6**	**Alt S-4**
YBI Sites					
IR Site 11, Former Landfill			✓	✓	✓
IR Site 29, East Side Contaminated Bridge Soils		✓	✓	✓	✓
IR Site 8, Former Army Point Sludge Disposal Area		✓	✓	✓	✓
Fuel Lines, Building 213		✓	✓	✓	✓
Building 270 LUST Site			✓	✓	✓
Building 204/208 LUST Site			✓	✓	✓
Building 40 LUST Site			✓	✓	✓
IR Site 13, Section E, Storm Water Off-Shore Sediments					✓
SFOBB Structure		✓	✓	✓	✓
East Span					
Bay Sediment		✓	✓	✓	✓
SFOBB Structure		✓	✓	✓	✓
Oakland Touchdown Area					
Bridge footings (eastern approach area)		✓	✓	✓	✓
Army Site #1 (western end of Burma Road)					✓
Caltrans Maintenance Facility[2]					
EBMUD Dechlorination Facility					✓
SFOBB Structure		✓	✓	✓	✓

Source: Hazardous Wastes Assessment, September 1998.

Note: [1] Leaking underground storage tank.

[2] Impact unknown as no sampling has been conducted around the maintenance facility.

Table 4.6-2 Comparison of Alternatives—Detour Options: Contaminated Sites

	Alternatives N-2, N-6, and S-4 Detour Options		
Impact Sites	**North Only**	**North-South**	**South Only**
YBI Sites			
IR Site 11, Former Landfill		✓	✓
IR Site 29, East Side Contaminated Pier Soils	✓	✓	✓
IR Site 8, Former Sludge Disposal Area	✓	✓	
Fuel Lines, Building 213	✓	✓	
Building 270 LUST Site		✓	✓
Building 204 LUST Site		✓	✓
Building 40 LUST Site		✓	✓
IR Site 13, Section E, Storm Water Off-Shore Sediments			

Source: Hazardous Wastes Assessment, September 1998.

construction traffic under dry, dusty conditions would include direct worker contact through ingestion or dermal contact. Although pesticides and semi-volatile organic compounds (SVOCs) were also detected in this area, a baseline human health risk assessment conducted in 1996 determined that the only potential concern was exposure to beryllium and lead.

Fuel Lines, Building 213 - Petroleum hydrocarbon contamination beyond the fuel oil line trenches could affect the soils near the base of the piers in this area (See Figure 3-15a in Appendix A).

- SFOBB Structure - Historic use of lead-based paint on the bridge structure will be of concern during bridge retrofitting activities. Concerns include both those associated with worker health and safety and handling and disposal of contaminated materials.

With the exception of the SFOBB structure, impacts to these sites should be limited to encountering contaminated soils and related dust during construction. Groundwater is not anticipated to be encountered during construction of this alternative.

Replacement Alternatives N-2, N-6, and S-4. Construction of any of the three replacement alternatives may affect the following sites:

- IR Site 11, Former Landfill - Groundwater may be encountered if construction of the temporary east entrance to the USCG should exceed the depth of 1.6 meters (5.4 feet) to 3.2 meters (10.6 feet) below ground surface.

- IR Site 29, East Side Contaminated Bridge Soils - During removal of existing piers and construction of new piers, workers may encounter soils contaminated by metals associated with past bridge maintenance and operations and also by petroleum hydrocarbons.

- IR Site 8, Former Army Point Sludge Disposal - During construction located immediately north of the existing SFOBB, exposure pathways to metals (especially beryllium and lead) due to heavy construction traffic under dry, dusty conditions would include direct worker contact through ingestion or dermal contact. Although pesticides and semi-volatile organic compounds (SVOCs) were also detected in this area, a baseline human health risk assessment conducted in 1996 determined that the only potential concern was exposure to beryllium and lead.

- Fuel Lines, Building 213 - Petroleum hydrocarbon contamination beyond the fuel oil line trenches could affect the soils near the base of the piers in this area (see Figure 3-15a in Appendix A).

- Building 270 LUST Site - Construction of a temporary detour above Building 270 may be affected by elevated concentrations of TPH/diesel in soils and the groundwater petroleum hydrocarbon plume associated with the leaking underground storage tank at this building.

- Building 204/208 LUST Site - Construction of replacement alternatives may affect a possible source of contamination at the Building 204/208 site. The former fire station/gas station site appears to be located upgradient from Building 270 (referenced above) and may be a possible source of groundwater contamination identified in the groundwater monitoring well immediately upgradient of Building 270.

- Building 40 LUST Site - Foundation, piers, or the relocated USCG access roadway would be located on ground currently occupied by Building 40, and footings for the detour spans may also occupy a portion of the ground surface of the building.

- SFOBB Structure - Historic use of lead-based paint on the bridge structure would be of concern during bridge demolition activities. Concerns include both those associated with worker health and safety and handling and disposal of contaminated materials.

In addition, Alternative S-4 would likely affect IR Site 13, Section E, Storm Water Off-Shore Sediments.

As compared to the Retrofit Existing Structure Alternative, impacts from construction on these sites could be substantial. Contamination from IR Site 29 and IR Site 8 is at or very near to the ground surface. Groundwater contamination will also likely be encountered at IR Site 11, Site 270 LUST, Site 40 LUST, and possibly from Site 204/208 LUST and the fuel lines at Building 213.

Oakland Touchdown Area.

No-Build Alternative. There are no impacts associated with the No-Build Alternative.

Retrofit Existing Structure Alternative. The Retrofit Existing Structure Alternative would likely encounter contamination that was detected around the bridge footings and bents of the eastern approach to the SFOBB. Contaminants of concern include total recoverable petroleum hydrocarbons (TRPH), volatile organic compounds (VOCs), pesticides, polychlorinated biphenyls (PCBs), and metals. The historic use of lead-based paint on the bridge structure will also be a concern during retrofitting activities. Concerns include both those associated with work health and safety and handling and disposal of contaminated materials.

Replacement Alternative Alignments N-2 and N-6. Alternatives N-2 and N-6 will likely encounter contamination that was detected around the bridge footings and bents of the eastern approach to the SFOBB. Exposure to this source area may be less than for the Retrofit Existing Structure Alternative, because the alignment is shifted north of the existing Touchdown area. As such, only the southern edge of Replacement Alternative N-2 should be close enough to the footings to disturb contaminated soil. The historic use of lead-based paint on the bridge structure will also be a concern during construction and/or retrofitting activities. Concerns include both those associated with worker health and safety and handling and disposal of contaminated materials.

Replacement Alternative Alignment S-4 Alternative S-4 may affect three sites:

- Army Site #1, (western end of Burma Road) - Construction activities and demolition of existing structures in the area may pose a risk to workers through direct exposure pathways of known or suspected contaminants via ingestion, dermal contact, or inhalation.

- EBMUD Dechlorination Facility - Although no known contamination has been detected near the dechlorination tanks, construction activities may be affected by the presence of sodium bisulfite in the soil.

- SFOBB Structure - Historic use of lead-based paint on the bridge structure would be a concern during bridge demolition and/or retrofitting activities. Concerns include both those associated with worker health and safety and handling and disposal of contaminated materials.

Differences in impacts resulting from exposure to these identified contaminant sources will depend on the exact location and nature of proposed construction activities and nature and extent of contamination in these areas.

4.6.3 Further Investigations

This section identifies data gaps and describes the actions necessary to characterize the known and potential contaminant sources that may be affected by the proposed SFOBB East Span Project alternatives.

Yerba Buena Island Data Gaps

The YBI area has been fairly well characterized. Once the preferred alternative has been selected, a complete and thorough data review will be conducted to identify the status of existing sites and whether any new concerns have been identified. Copies of pending reports from the Navy would be requested. Results of subsurface investigations identified currently as proposed will also be requested. Current analytical data from existing groundwater monitoring wells will also be requested and analyzed.

Oakland Touchdown Area Data Gaps

While the western portion of the Touchdown area along the existing East Span alignment has been fairly well studied, reasonable uncertainty about environmental conditions exists in several other areas. These areas include:

- North shore of peninsula along traffic lanes back to SFOBB Toll Plaza. This area is presently undeveloped. Historically, portions of this area were created by artificial fill from unknown dredge material from San Francisco Bay.

- East of the elevated part of existing bridge approach. This area includes a thin strip of land on both sides of the traffic lanes as far east as the toll plaza. The soil in this area may contain TPH as motor oil, SVOCs, and lead.

- Caltrans maintenance facility. Dark oil stains were observed, and a large transformer was stored in this area. No sampling has been conducted around these buildings.

- Area surrounding dechlorination tanks. This area may be the source of sodium bisulfite contamination in the soil.

In-Bay Area Data Gaps

Based on information reviewed for this assessment, the in-Bay sediments at the existing East Span have been initially characterized for the purposes of sediment disposal and worker health and safety during construction. This data is expected to generally reflect current conditions along the replacement alignments. The need for additional investigations in this area prior to construction will be determined in consultation with the Dredged Material Management Office (DMMO).

Additional Investigations—All Areas

Prior to the implementation of the actions below, the East Span Project preferred alternative would be identified. The following information will be developed during final engineering design during development of the FEIS:

- Final determination of sites that will be fully or partially acquired; and
- Determination of specific construction activities planned on or near a potential contaminant source.

Once the preferred alternative has been selected and additional available information reviewed, a Phase II Environmental Site Investigation would be conducted for the preferred alternative to sufficiently characterize contaminant management and disposal concerns during construction, and to identify worker and health and safety issues that will need to be addressed. The Phase II investigation would be scoped to address identified contaminants of concern and would consider the nature and extent of proposed construction activities. The Phase II efforts would consider the areas identified above (i.e., data gaps) for which limited data is known. All Phase II investigation efforts would focus on developing specific information about contaminated sites that could affect construction of the preferred alternative to develop hazardous wastes specifications for inclusion in the construction bid documents. Phase II investigations will be limited to the level of investigation required to prepare sufficient contractor bid documents (e.g., contaminant management and health and safety procedures) because additional sampling and testing would be required during construction to ensure the proper management of contaminated media encountered.

4.6.4 Mitigation

Mitigation - All Build Alternatives.

Once the preferred alternative has been selected and Phase II investigations completed, mitigation of identified hazardous materials concerns would include those for the proper management and disposal of hazardous wastes encountered during construction and precautions for worker health and safety. These measures are discussed further below.

Contaminant Management.

Highly contaminated soils would be disposed of in a Class I landfill. Non-contaminated soils may be disposed of in either a Class II or a Class III landfill, recycling facility, or released to the contractor for use as backfill material on site. Bay muds excavated for access dredging under all build alternatives would be disposed of at an approved in-Bay disposal site or at an upland site. In-Bay disposal would occur only with approval of permitting agencies. Consultation with the Dredged Material Management Office (DMMO) has been initiated to determine appropriate in-Bay disposal sites. Any removed materials not disposed of in-Bay would be transported to approved upland disposal sites or landfills by licensed waste haulers under state manifests or bills of lading as required.

If dewatering is required to construct new footings and piers, the footing may be hydraulically isolated from the groundwater and Bay water by using sheet piling or cofferdams. The use of these techniques would reduce the volume of groundwater that needs to be removed for dewatering.

Contaminated groundwater requires a discharge permit to a sanitary sewer or the Bay. Depending on the concentration, petroleum hydrocarbons may be removed from the dewatering discharge by passing it through an activated granular carbon system or using an air-stripping unit. Metals in the groundwater may require treatment. Treatment may be accomplished on site or off site. On-site treatment may include settling and precipitation of the metals in a portable tank unit. Treated water could be discharged while the sludge material would be tested and disposed of at a proper disposal facility. Off-site treatment of contaminated groundwater would involve transporting the water to an appropriate treatment facility.

Once the project area has been sufficiently characterized and construction activities sufficiently defined, a contaminant management plan would be developed and implemented during construction. The plan would include site-specific procedures for contaminant monitoring and identification, temporary storage, handling, treatment, and disposal of materials in accordance with applicable federal, state, and local laws and regulations.

Contingency Planning.

In the event hazardous materials are unexpectedly encountered during construction, a contingency plan would be in place establishing procedures for temporary stoppage of work, securing of the area, notification of the discovery, and proper management of such materials. All procedures would be consistent with Caltrans' guidelines and federal, state, and local laws and regulations.

Dismantling.

Dismantling of all structures, especially the existing SFOBB, would include procedures for the identification, abatement, handling, and disposal of lead-based paint and asbestos, as well as worker health and safety. All procedures would be consistent with Caltrans' guidelines and all federal, state, and local laws and regulations.

Workers performing activities on site that may involve contact with contaminated soil or groundwater would be required to have appropriate health and safety training. In order to reduce the risk of exposure, a Worker Health and Safety Plan would be prepared and implemented during construction by a Certified Industrial Hygienist (CIH). The Health and Safety Plan would include provisions for:

- Conducting preliminary site investigations and analysis of potential job hazards;
- Personal protective equipment;
- Safe work practices;
- Site control;

- Exposure monitoring;
- Decontamination procedures; and
- Emergency response actions.

The plan would specify mitigation of potential worker and public exposure to airborne contaminants by incorporating dust suppression techniques in construction procedures.

4.7 GEOLOGY, SOILS, AND SEISMICITY

This section describes the relationships between project features and expected soil conditions in the project area and also describes issues related to possible seismic events.

4.7.1 Soil and Rock Stability and Settlement

No-Build and Retrofit Existing Structure Alternatives

The No-Build and Retrofit Existing Structure Alternatives would not change area topography and, as such, would not affect slope stability within the project area. Design of the Retrofit Existing Structure Alternative has been based on current soils information, and foundation improvements would reduce the risk of settlement.

Replacement Alternatives N-2, N-6, and S-4

The Replacement Alternatives N-2, N-6, and S-4 were developed to respond to the changing geological conditions along the general alignment, including the Bay muds, which occur as a blanket of sediments that cover the majority of the Bay bottom between Yerba Buena Island (YBI) and the Oakland Touchdown area. The entire Holocene and Pleistocene estuarine and alluvial sequence become increasingly thicker eastward from YBI to the Oakland Touchdown area. Construction of a signature tower which must be anchored to bedrock is not feasible in the eastern portion of the alignments.

Yerba Buena Island. Initial geotechnical data indicate that several slope stability-related issues could be associated with design of the land and marine tower foundations in the vicinity of YBI. These issues include: the gross stability of the east-facing slope of YBI, the temporary stability of the cut for the main tower, and the potential for slope failures in the vicinity of the west foundation for the main span.

To address the slope stability issues, geologic mapping performed on YBI would be integrated with marine exploration and laboratory testing (as it becomes available). Stability analyses for the various potential slope failure modes would be performed. It is anticipated that slope stability issues can be addressed during final design of the selected preferred alternative.

Oakland Touchdown Area. The soils at the end of the Oakland shore from the current ground elevation to 1.5 meters (5 feet) below mean sea level (MSL) are potentially liquefiable fill material. This fill is underlain by approximately 12 meters (39 feet) of soft clay and stiff clay. The potential for liquefaction exists for those fill soils that lie beneath the water table. In a seismic event, liquefaction could occur, resulting in lateral spreading of the fill material. The fill could also settle (without liquefaction) during a seismic event. If an earth fill option is chosen for creating an at-grade approach structure, embankment fill would be placed on certain sections of the landfall that may be prone to settlement due to consolidation of the soft clay.

To compensate for potential settlement at the Oakland Touchdown area, wick drains and a surcharge could be provided to accelerate the consolidation process of the new

embankment fill. The existing soil serving as the future roadway might require design considerations such as ground modification in the form of stone columns, compaction, or similar methods to reduce the risk of unacceptable settlement and/or lateral spreading.

4.7.2 Seismicity

The project area will likely experience strong to very strong seismically induced ground shaking within the design life of all build alternatives. Under all replacement alternatives, some damage to bridge components would be expected to occur during a major seismic event; however, the components should still be able to perform their design functions. In general, strong ground shaking can cause one or more of the following:

- Densification of loose granular soils
- Cracking, spreading, and settlement of embankment material
- Failure of embankments and natural slopes
- Liquefaction (which can contribute to settlement, slope failure, spreading, and forces on structures)
- Structural distress to bridges, retaining walls, and culverts

Surface fault rupture and resulting displacement is not expected since there are no known faults along the alignments.

No-Build Alternative

Under the No-Build Alternative, the existing East Span would be able to withstand a moderate earthquake. However, it is anticipated that the existing East Span would experience multiple failures at structure joints and potential collapse into the Bay in the event of a Maximum Credible Earthquake (MCE).

Retrofit Existing Structure

The Retrofit Existing Structure Alternative would provide additional support to the existing East Span compared to the No-Build Alternative. Following retrofit construction, the bridge should be able to withstand an MCE. It is anticipated that in the event of an MCE, the retrofitted East Span would experience damage to truss members in the steel superstructure. The addition of new piers E2A and E2B would eliminate a current imbalance in the existing main span, which would reduce structural damage. Although the retrofitted main span would be expected to withstand an MCE, it is likely that the main span structure, and potentially other shorter spans, would require extensive repair or replacement, possibly requiring closure of the bridge for a six-month to one-year period, depending on the extent of the damage.

Replacement Alternatives N-2, N-6, and S-4

The replacement alternatives would be designed to meet current seismic safety standards. It is expected that replacement alternatives would withstand an MCE on the San Andreas or Hayward faults. Seismic design criteria for all replacement alternatives are intended to ensure non-collapse and serviceability of structures when subjected to peak acceleration during a seismic event.

Potential for damage resulting from an MCE exists. The main span tower structure near YBI would be sited on shallow, sloping bedrock, requiring foundations deep into rock. Damage due to tower settlement in an MCE would most likely be minor and confined to local deflection, cracking, and misalignment of pavement on the main span. Anticipated damage could easily be repaired to permit the replacement alignment to serve a lifeline function.

There is potential for cracking, spreading, and settlement of bridge embankments throughout the project area, particularly at the Oakland Touchdown area. The damage would most likely consist of small earth slumps, differential settlement, misalignment, separation, and cracking which can be quickly repaired. The likelihood of large-scale shear failure of embankments is small.

4.7.3 Tsunamis

Based on USGS map information, it appears that most of the Oakland Touchdown area, which ranges in elevation from about 0 to 3.6 meters (0 to 12 feet) would be subject to inundation from a 200-year-return-period tsunami. At lower return periods (for example, 25 to 100 years), the potential for inundation decreases substantially.

The effects of a tsunami would be flood damage, erosion, and damage caused by wave and water forces on structures. People, automobiles, and buildings could be washed away as during a flood. Tsunami warnings are a component of the regional emergency warning system and would be implemented in the case of a threat of tsunami inundation.

The structural design of the SFOBB replacement alternatives on the Oakland Touchdown area would include the capability of resisting water/wave/current-induced loading.

4.8 WATER QUALITY

This section discusses potential impacts to water quality in the project area and associated mitigation measures. The water quality impacts and design considerations discussed in this section would generally be the same for all the replacement alternatives.

4.8.1 Surface Water Quality

No-Build Alternative

The No-Build Alternative would not modify current water quality conditions as current methods of operation and maintenance would continue.

Retrofit Existing Structure Alternative

The Retrofit Existing Structure Alternative may have a temporary water quality impact during construction activities. These activities may include dredging, dewatering, concrete pouring, welding, and other activities that have the potential to impact water quality (see Section 4.14.7 for discussion of construction-related impacts). Potential long-term impacts have also been evaluated, and it has been determined that there are no long-term impacts because the existing facility would not be modified in terms of its operation and drainage system. Therefore, current water quality conditions would not be altered.

Replacement Alternatives N-2, N-6, and S-4

All replacement alternatives have similar potential to affect water quality in San Francisco Bay, both during and after construction (see Section 4.14 for discussion of construction-related impacts).

The replacement alternatives would consist of two parallel bridge decks, each accommodating five standard travel lanes and standard shoulders. The overall width of the westbound bridge deck is proposed to be 25.07 meters (82 feet). The width of the eastbound bridge deck, which includes a 4.7-meter (15.5-foot) pedestrian/bicycle path, would be 29.72 meters (97.5 feet). The replacement alternatives would increase the surface area exposed to precipitation. A corresponding increase in the quantity of pavement storm water runoff from the East Span from a given rainfall event is expected.

Pollutants commonly found in highway storm water runoff include heavy metals, oil and grease, suspended and dissolved solids, nutrients, bacteria, and some of the hydrocarbons in the gasoline and diesel range. Pollutants less common in highway storm water runoff include volatile organics, semi-volatile organics, phenols, pesticides, polychlorinated biphenyls, and synthetic biocides, depending on the characteristics and location of the highway.

Impacts. The proposed replacement alternatives would not be expected to increase concentration levels of those pollutants commonly found in highway runoff, nor is the design expected to elevate the levels of those less common constituents. However, the mass loading of some constituents may increase relative to the increase in exposed area.

The proposed concrete structures should not require the sandblasting and painting effort currently expended in maintaining the existing SFOBB. The expected reduction in paint removal and painting efforts should provide a long-term reduction of adverse water quality impacts associated with maintenance of the existing structure. This would be considered a beneficial effect. Furthermore, an additional water quality benefit would be obtained from the new bridge design by the addition of traffic shoulders, in that the impacts caused by discharges that result from vehicle accidents and spills would be minimized by the increase in emergency response. The traffic shoulders would allow emergency vehicles, maintenance crews, and hazardous material response teams to travel freely on the shoulder to an accident location. Additionally, traffic shoulders would allow for enhanced sweeping operations on the bridge by being able to drive sweeper vehicles at slower speeds and conduct the operations without the need for lane closures and traffic obstruction. Slower sweeping operations combined with state-of-the-art sweeping equipment would more effectively pick up finer particles and associated pollutants. Eliminating or minimizing lane closures would also help traffic flows which, in turn, would minimize the deposition of pollutants related to stop-and-go traffic, such as metals from brake pad linings.

Finally, in accordance with the existing NPDES Permit for Caltrans District 4, Permanent Control Measures (PCMs) will be considered as part of the project design to control and minimize the discharge of pollutants to the Bay to the extent practicable.

4.8.2 Groundwater Quality

All Project Alternatives

There are no known long-term impacts to groundwater quality as a consequence of the construction of this project. Section 4.14.7 discusses the potential construction-related groundwater impacts. These would be mitigated with the proper implementation of a Storm Water Pollution Prevention Plan (SWPPP) developed for this project. The SWPPP would address all construction management practices that have the potential to impact water quality and would identify appropriate control measures to be taken by the Contractor to minimize such potential impacts. The SWPPP will include specific Best Management Practices (BMPs) to be implemented to control and prevent the discharge of pollutants to surface waters as well as groundwater.

4.9 NATURAL RESOURCES

Permanent or temporary impacts to natural resources may occur in association with each project alternative. This section discusses permanent impacts, which may result in direct impacts to species or habitat that require acreage replacement. Specific mitigation measures will be developed in consultation with regulatory and permitting agencies. Conceptual mitigation measures are presented following each resource affected by a project alternative.

Temporary impacts to natural resources are identified as impacts from construction activities, such as construction noise from pile driving, or air emissions. These temporary impacts would end upon completion of construction and are addressed in Section 4.14.

For detailed documentation of potential effects to natural resources, please refer to the Natural Environment Study and Biological Assessment prepared for the East Span Project. These technical reports are available for review at the locations listed in the Preface.

Permanent impacts are presented in four categories: Bay fill, wetlands and special aquatic sites, special status species, and other natural resources.

4.9.1 Bay Fill

Project build alternatives would require placement of new fill in San Francisco Bay. Fill would be required to construct expanded pier foundations for the Retrofit Existing Structure Alternative and new pier foundations for the replacement alternatives.

No-Build Alternative

No new fill would be placed in San Francisco Bay as a result of the No-Build Alternative.

Retrofit Existing Structure Alternative

The Retrofit Existing Structure Alternative would require work in San Francisco Bay to expand and strengthen existing bridge piers E2 through E22 and to construct the two new main span piers, E2A and E2B. Expansion of existing piers would require placing new footings at existing piers, expanding the existing pile caps and encasing piers in concrete. Pile caps would remain above the water line. Temporary cofferdams would be driven around piles during the construction period. New piers would be constructed on driven piles.

Total estimated amount of new Bay fill to strengthen existing piers and construct new piers is 54,100 cubic meters (1,910,500 cubic feet). Temporary Bay fill associated with construction of trestle footings is approximately 4,032 cubic meters (142,370 cubic feet). Consultation with the Army Corps of Engineers (ACOE) and BCDC would occur to ensure the appropriate permit is obtained prior to work in the waters of the U.S. and BCDC Bay jurisdiction. (See Table 4.9-1.)

Table 4.9-1 Placement of New Fill in San Francisco Bay - Build Alternatives

Alternative	Activity		
	Fill in Waters of the U.S. (Open Waters) to Construct Piers and Footings (cubic meters/feet)	**Removal of Existing East Span Piers to Mudline (cubic meters/feet)**	**Net Fill-Removal of existing piers minus the placement of fill in open waters(cubic meters/feet)**
Retrofit Existing Structure	54,100/1,910,500	Not Applicable	54,100/1,910,500
Replacement Alternatives			
N-2, Self-Anchored Suspension Design Option	14,800/522,700	78,200/2,761,600	63,400/2,239,000
N-2, Cable-Stayed Design Option	15,500/547,400	78,200/2,761,600	62,800/2,217,800
N-2, Skyway Design Option	20,300/716,900	78,200/2,761,600	58,000/2,048,300
N-6, Self-Anchored Suspension Design Option	14,900/526,200	78,300/2,761,600	63,400/2,239,000
N-6, Cable-Stayed Design Option	16,500/582,700	78,200/2,761,600	61,800/2,182,400
N-6, Skyway Design Option	20,300/716,900	78,200/2,761,600	58,000/2,048,300
S-4, Self-Anchored Suspension Design Option	14,900/526,900	78,200/2,761,600	63,400/2,239,000
S-4, Cable-Stayed Design Option	16,500/582,700	78,200/2,761,600	61,800/2,182,400
S-4, Skyway Design Option	20,400/720,400	78,200/2,761,600	57,900/2,044,700

Source: Parsons Brinckerhoff, September 1998

Replacement Alternatives

All replacement alternatives would place fill in San Francisco Bay to construct new piers and pile caps to support the parallel roadway structures. The total area of new Bay fill would vary by alternative from 14,800 cubic meters (522,700 cubic feet) for Alternative N-2, Self-Anchored Suspension Design Option, to 20,400 cubic meters (720,400 cubic feet) under Alternative S-4, Skyway Design Option. Quantities of Bay fill for the replacement alternatives are shown in Table 4.9-1.

Replacement alternatives would include dismantling of the existing East Span following completion of the new bridge. Dismantling of the existing East Span would remove existing piers to the mud line. The resulting reduction in Bay fill would be 78,200 cubic meters (2,761,600 cubic feet). Consequently, replacement alternatives would result in a total reduction of project-related Bay fill ranging from 63,400 cubic meters (2,239,000 cubic feet) to 57,900 cubic meters (2,044,700 cubic feet).

Placement of fill into the Bay would result in impacts to the surface area which support marine organisms. Removal or loss of benthos displaced by the new piers would result in a decrease of localized productivity. Removal of the existing piers to the mud line would result in an increase of available surface area for the benthic community. No net loss of surface area is anticipated. Depending on the rate of sedimentation for the new surface layers, recovery of the benthic community would occur within one to several seasons. In addition, removal of the existing piers would result in a loss of sessile organisms. Placement of new piers would provide new surface area for sessile organisms. No net loss of surface area is anticipated.

4.9.2 Wetlands and Special Aquatic Sites

Impacts to wetlands and special aquatic sites, including mudflats and eelgrass beds, are subject to ACOE jurisdiction under Section 404 of the Clean Water Act. Wetlands and special aquatic sites typically provide valuable habitat for wildlife. For example, mudflats in the project area provide feeding and resting habitat for shorebirds, and eelgrass provides spawning habitat for herring. A discussion of impacts to jurisdictional wetlands and special aquatic sites is provided below.

No-Build and Retrofit Existing Structure Alternatives

The No-Build and Retrofit Existing Structure Alternatives would not affect mudflats, wetlands, or eelgrass beds.

Replacement Alternatives N-2 and N-6

Wetlands. The re-alignment of Burma Road for Alternatives N-2 and N-6 would result in the loss of 0.03 hectare (0.07 acre) of non-tidal wetland. The affected wetland area is located on the south side of the Oakland Touchdown and provides shorebird resting habitat during high tides. The wetlands located on the north side of the Oakland Touchdown would not be affected by Alternatives N-2 and N-6.

Mudflats. Both northern replacement alternatives have the potential to affect intertidal mudflats. Alternative N-2 would remove approximately 0.12 hectare (0.3 acre) of mudflats along the northern shore of the Oakland Touchdown area. Alternative N-6 would remove approximately 0.12 hectare (0.3 acre) of intertidal mudflats along the northern shore of the Oakland Touchdown area. Mudflats at this location provide valuable feeding habitat for shorebirds.

Eelgrass. Alternatives N-2 and N-6 would result in removal of approximately 0.25 hectare (0.61 acre) of eelgrass beds located off of the northern shore of the Oakland Touchdown area. As discussed in Section 3.9.4, this eelgrass area is comprised of scattered patches of eelgrass. Both northern alternatives would affect a narrow band of eelgrass located on the northern rocky shore of YBI. Approximately 0.50 hectare (1.2 acres) of eelgrass would be affected by the placement of work barges used for the duration of construction of the replacement alternatives.

Replacement Alternative S-4

Wetlands. The S-4 Alternative would result in the loss of 0.04 hectare (0.1 acre) of wetland. The affected wetland area is located on the southern portion of the Oakland Touchdown and provides a valuable resting area for shorebirds during high tides.

Mudflats. The Alternative S-4 would result in the loss of 0.06 hectare (0.15 acre) of mudflats located along the beach, on the south side of YBI.

Eelgrass. Approximately 0.30 hectare (0.75 acre) of eelgrass located on the southern portion of YBI would be removed by Alternative S-4. As discussed in Section 3.9.4, there are two discrete eelgrass bed areas; both would be removed by Alternative S-4.

4.9.3 Special Status Species

Special status species include all plants and wildlife protected under the federal and state Endangered Species Acts, the Migratory Bird Treaty Act, and the Marine Mammal Protection Act. Impacts to special status species are described below by each project alternative.

No-Build Alternative

Since the No-Build Alternative does not include any disturbance of the existing environment, there would be no impacts to special status plant and wildlife species.

Retrofit Existing Structure

The Retrofit Existing Structure Alternative has the potential to temporarily affect the American peregrine falcon, double-crested cormorant, Pacific herring, chinook salmon, steelhead, green sturgeon, and longfin smelt. Impacts to these species are associated with construction activities that would continue for approximately 48 months. Since these species would only be affected temporarily during construction activities, impacts are addressed in Section 4.14 of this report. A discussion of mitigation measures is also provided in Section 4.14, following the impact section.

Replacement Alternatives N-2, N-6, and S-4

The northern and southern replacement alternatives would result in temporary impacts to harbor seals, chinook salmon, steelhead, green sturgeon, and longfin smelt. Temporary impacts are associated with construction activities that would continue for approximately 51 months. Since these species would only be affected temporarily during construction activities, impacts are addressed in Section 4.14 of this report.

Both northern replacement alternatives could result in permanent impacts to marsh gumplant, double-crested cormorant, American peregrine falcon, western gulls, and shorebirds. Replacement Alternative S-4 could result in permanent impacts to the double-crested cormorant, shorebirds, western gulls, and the American peregrine falcon. The replacement alternatives would not result in impacts to the California brown pelican, saltmarsh common yellowthroat, and California clapper rail. A discussion of these species is provided below.

Marsh Gumplant/Alameda Song Sparrow. As shown in Figures 3-17 and 3-18 in Appendix A, marsh gumplant occurs in four areas within the project area. Only one location of marsh gumplant would be affected by the northern replacement alternatives. Replacement Alternative S-4 would also result in the removal of marsh gumplant, located to the south of the existing bridge on Port of Oakland property. Impacts to the marsh gumplant would not affect the long-term viability of the species; however, construction of the project would reduce the amount of marsh gumplant in the area, which is potential supporting habitat for the Alameda song sparrow.

Double-Crested Cormorant. Double-crested cormorants currently nest on the existing East Span. Construction of any replacement alternative would include the dismantling of the existing East Span bridge, which would result in removal of nesting sites for the double-crested cormorant.

Construction activities associated with a replacement alternative could also potentially cause indirect impacts to nesting cormorants due to noise and visual disturbance. These impacts are addressed in Section 4.14.

American Peregrine Falcon. An American peregrine falcon pair nests on the existing East Span. Construction of a replacement alternative would include dismantling the existing East Span structure which would result in the removal of nesting sites for the American peregrine falcon.

Construction activities associated with a replacement alternative would potentially cause indirect impacts to nesting and roosting peregrines due to noise and visual disturbance. These temporary impacts are discussed in Section 4.14. Impacts to this species would primarily be associated with construction activities that occur during the breeding season, February 1 through July 31.

Shorebird Species. Shorebirds include migratory birds which are protected under the Migratory Bird Treaty Act. The replacement alternatives would not result in a direct impact to shorebird species; however, they would result in the removal of supporting resting and feeding habitat. As discussed under Section 4.9.2, the northern replacement alternatives would result in the removal of mudflats. The removal of mudflats along the northern portion of the Oakland Touchdown area would decrease the amount of shorebird feeding habitat available and shade mudflat areas that would remain after construction is complete. This impact would occur in association with Replacement Alternatives N-2 and N-6 only.

The S-4 replacement alternative would result in the removal of shorebird upland refugia, which provides valuable resting habitat during high tides. Upland refugia occurs on the south side of the Oakland Touchdown area and is known to support roosting shorebirds during wintering months.

Western Gull. Potential direct impacts to the western gull would occur if nests are present on pier footings of the existing East Span SFOBB prior to the dismantling of the structure.

Saltmarsh Common Yellowthroat/California Clapper Rail. Direct impacts to the saltmarsh common yellowthroat and California clapper rail are not anticipated since they occur at the Emeryville Crescent, which is located outside of the project area. Indirect impacts, including noise, would not occur since construction activities would not result in an increase in noise levels at the Emeryville Crescent area.

California Brown Pelican. Direct impact to the California brown pelican would not occur since this species does not nest in the project area. Indirect impacts to the California brown pelican are not anticipated since the proposed construction activities would discourage pelicans from resting or foraging near the existing bridge.

Economically Important Fish

Pacific Herring. The northern and southern replacement alternatives would result in temporary impacts to Pacific herring. Temporary impacts are addressed in Section 4.14.8 of this report.

4.9.4 Other Natural Communities

Patches of natural communities such as coast live oak woodland, northern coastal scrub, and northern coastal saltmarsh occur within the project area. Impacts would only occur to the coast live oak woodland in association with the replacement alternatives.

Coast Live Oak Woodland. Three patches of coast live oak woodland occur on slopes of the YBI. Portions of two of these areas could be removed by the alteration of Macalla Road, which is required for all of the replacement alternatives using the North Detour Option. Macalla Road would be realigned at a lower grade in an area located within the dripline of the tree overstory. This activity would damage the root zone of trees and result in a loss of six coast live oak trees. The coast live oak trees that would be affected range in diameter-base-height (dbh) from 45 to 127 centimeters (18 to 50 inches).

4.9.5 Consultation and Coordination

Consultation and coordination with federal, state, and regional agencies has been initiated for the East Span Project. Consultation pursuant to the NEPA/404 Integration MOU is in progress with EPA, USFWS, ACOE, and NMFS. A summary of the NEPA/404 Integration MOU process and concurrence letters are included in Appendix F.

In addition, the ACOE has concurred in the delineation of waters of the U.S., including wetlands and special aquatic sites subject to Section 404 of the Clean Water Act. The ACOE concurrence letter can be found in Appendix F.

Consultation will be initiated with the USFWS regarding the American pegrine falcon, which is protected under Section 7 of the Endangered Species Act, and species protected under the Migratory Bird Treaty Act, including the California brown pelican, western sandpiper, and black-bellied plover. Coordination will be initiated with the NMFS concerning the potential for impacts to fish species protected under the

Endangered Species Act, including the chinook salmon and steelhead, and marine mammals protected under the Marine Mammal Protection Act. In addition, consultation regarding potential impacts to Pacific herring and species regulated under the California Endangered Species Act, including the double-crested cormorant, will occur with the CDFG.

Resource agencies will review and comment on this Draft EIS and supporting technical studies. A mitigation and monitoring plan for the selected preferred alternative would be developed and provided for comment. The Final EIS will report the results of consultations under the federal and state Endangered Species Acts. Agency concurrence in the impact assessment and mitigation concepts will be obtained prior to federal approval of the Final EIS.

4.9.6 Mitigation

Retrofit Existing Structure Alternative

The effects of the Retrofit Existing Structure Alternative are temporary in nature due to construction activities. These effects and their mitigation are discussed in Section 4.14.8.

Replacement Alternatives N-2, N-6, and S-4

Wetlands. Replacement Alternatives N-2 and N-6 would result in the loss of 0.03 hectare (0.07 acre) of non-tidal wetland located on the south side of the Oakland Touchdown. The S-4 Replacement Alternative would result in the total loss of 0.04 hectare (0.10 acre) of two non-tidal wetland areas on the south side of the Oakland Touchdown. Loss of jurisdictional wetlands will be mitigated at a mitigation ratio of 3:1 by the creation of new wetland habitat or enhancement of existing wetlands within the project area. The mitigation ratio is a function of the habitat value of land that would be affected relative to the land to be acquired. This approach is based on habitat evaluations conducted for similar projects within the Bay Area.

Potential mitigation sites located in the project area include the Oakland outer harbor, located on the south side of the Oakland Touchdown, and the Emeryville Crescent. The impacts to non-tidal wetlands will occur to wetlands located on the Oakland outer harbor. Mitigation of project impacts could be accomplished by purchasing some property in the Oakland outer harbor or the Emeryville Crescent for creation of shallow non-tidal wetlands and preservation. Lands acquired for mitigation would be created or enhanced to provide a no-net loss of in-kind wetland habitat value and acreage. A conceptual mitigation plan will be developed in consultation with the California Department of Fish and Game, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Army Corps of Engineers, and the U.S. Environmental Protection Agency following the identification of the preferred alternative for the project. This conceptual plan will be discussed in the Final EIS and will address the following issues:

- Goals,
- Site options,
- Implementation plan,
- Success criteria, and

- Maintenance and monitoring.

During final project design and the project permit process, the conceptual mitigation plan will be further refined into the final detailed project mitigation and monitoring plan.

Eelgrass. Both of the northern replacement alternatives would result in the loss of 0.75 hectare (1.8 acre) of eelgrass beds located on the north shore of the Oakland Touchdown and YBI. Of this amount, about 0.50 hectare (1.2 acres) would be affected by placement of work barges. The southern replacement alternative would result in the loss of 0.30 hectare (0.75 acre) of eelgrass located along the southern shore of YBI. Mitigation for impacts to eelgrass beds will include transplanting the eelgrass to be removed to adjacent shallow areas to in-fill existing stands, currently containing scattered patches of eelgrass. Creation of eelgrass beds is considered experimental, and appropriate pre-creation studies, post-project monitoring, and contingency measures will be developed and implemented to ensure successful creation of eelgrass beds as proposed. Successful transplanting of eelgrass beds are dependent on the following variables: 1) balance of sedimentation and scour, 2) transplantation protocol for eelgrass, 3) compression and settling of the sediment fill and underlying material, and 4) contamination. Due to the experimental nature of successfully transplanting eelgrass beds a 3:1 replacement ratio will be implemented. As discussed for the wetland mitigation, a conceptual mitigation plan will be addressed in the Final EIS.

Mudflats. Replacement Alternatives N-2 and N-6 would result in the removal of 0.12 hectare (0.3 acre) of mudflats on the north side of the Oakland Touchdown. The southern replacement alternative would result in the loss of 0.06 hectare (0.15 acre) of mudflats located along the south side of YBI. Potential mitigation sites would include the Oakland middle harbor that provides opportunities to restore intertidal mudflat habitat. As discussed for the wetland mitigation, a conceptual mitigation plan will be developed for the replacement of mudflats at a ratio of 3:1 and will be included in the Final EIS.

Special Status Species.

American Peregrine Falcon. The removal of the existing bridge would result in the loss of nesting area for the peregrine falcon. Mitigation, summarized below, will be similar to that outlined in the contract between Caltrans and the Santa Cruz Predatory Bird Research Group (SCPBRG) for the interim seismic retrofit project.

Mitigation for the East Span peregrine pair will consist of a monitoring and release program conducted during each year of bridge construction and during the dismantling of the existing bridge. Any chicks present on the existing bridge will be removed and released at a natural site in either Point Reyes, the Channel Islands or the Sierra Nevada mountains. These activities will be conducted by the SCPBRG.

If dismantling of the existing bridge occurs during the nesting season, off-site release efforts will be conducted by the SCPBRG. If dismantling of the bridge occurs during

the non-breeding season, a monitor from the SCPBRG will ensure that adults and juveniles are not present on the bridge during the period of dismantling.

Peregrines would likely nest on the new bridge once construction activities associated with the project are complete. Therefore, no nest structures would be created on the new bridge for peregrines. If peregrines do recolonize the new bridge, monitoring and off-site release efforts by the SCPBRG will continue as they have for the existing bridge, if necessary to avoid potential maintenance activity impacts.

Double-crested Cormorant. Mitigation for permanent loss of habitat is currently being investigated and will include on-site or off-site mitigation or a combination of both as outlined below:

On-site Mitigation

In order to mitigate for the permanent loss of nesting habitat for this species due to the dismantling of the existing bridge, nest ledges could be constructed on piers of the new bridge. Double-crested cormorants could be attracted to the platforms using decoys and social attraction methods. Maintenance of platforms would not be required; however, platforms should be replaced as necessary. The creation of nest structures along the new bridge would prevent conflicts with future maintenance activities that would likely occur along other areas of the new structure.

Consultation between the bridge architects and the resource agencies will be required before a final design for the platforms can be made. Aspects under consideration for the platforms include the following:

- Each platform should hold five to six nests.
- Four to five platforms would be placed on one bridge pile; approximately 100 platforms could be provided.
- Platforms should be at least 73 meters (240 feet) above the surface of the water.
- Decoys would be used to attract birds to the platforms once construction activities on the new bridge are complete.
- Platforms would be replaced as necessary.

Off-site Mitigation.

Option 1. Off-site enhancement of nesting habitat for this species could be another mitigation option as an alternative to, or in additon to, on-bridge nesting sites. One off-site mitigation option would be to establish nesting habitat for double-crested cormorants at CDFG-managed land near Vallejo. Restoration of several salt ponds in that area will cause the removal of artificial structures used by double-crested cormorants as nesting and roosting sites. Since cormorants are already breeding in these salt ponds, the creation of new platforms in the ponds would have a high chance of attracting cormorants. New artificial structures such as wharves could be floated in the salt ponds and anchored before existing structures are removed.

Option 2. A second option relates to a settlement that will soon be reached over a recent oil spill into the San Francisco dry docks from a Federal Department of Transportation vessel. Several double-crested cormorants were impacted by the spill. Through coordination with CDFG staff, it has been suggested to create a partnership between Caltrans and the CDFG or USFWS to enhance natural habitat in the Bay for double-crested cormorants as wells as other seabird species.

Under this proposal, funds from the oil spill settlement and project mitigation funds could be used to purchase Red Rock Island (located south of the Richmond-San Rafael Bridge) to enhance the habitat to encourage double-crested cormorant nesting. Enhancement of the area may include a social attraction project where decoys and taped recordings of double-crested cormorant calls are played in order to attract this species to nest at the site. Red Rock Island would be managed by either the CDFG or the USFWS. A similar social attraction project is being conducted for common murres at Devil's Slide along Route 1, in San Mateo County, and has been very successful. However, double-crested cormorants are not known to have nested on Red Rock Island in the past. Thus, this proposal would be highly experimental.

The above on-site and off-site options will be coordinated with the resource agencies and the resulting mitigation measures for the double-crested cormorant will be included in the conceptual mitigation plan and discussed in the final EIS.

Shorebird Species. Shorebirds are protected under the Migratory Bird Treaty Act and would be affected by all replacement alternatives that would result in the removal of mudflats and upland refugia. The northern and southern replacement alternatives would remove mudflats that currently provide feeding habitat for shorebirds. Removal of 0.12 hectare (0.3 acre) of mudflats associated with the northern alternatives and 0.06 hectare (0.15 acre) associated with the southern alternative is not anticipated to adversely affect shorebirds. The realignment of the Caltrans maintenance road, associated with the northern replacement alternative, would remove the upland habitat currently used by the shorebirds for roosting during high tide. The southern replacement alternative would result in the removal of upland refugia. The decline in the amount of upland habitat located adjacent to mudflats throughout the Central Bay has reduced the areas available to shorebirds for roosting, during high tides.

Mitigation for the removal of upland refugia would include preservation of upland areas as part of the new park envisioned for the southern portion of the Oakland Touchdown area. The park would be in areas formerly within the Caltrans right-of-way, as well as on land within the Oakland Army Base. The park would provide public access to the Bay and would include an excluded area of upland refugia for the shorebirds. The design for the park would include an upland refugia area fenced off from public access to prevent human or animal disturbance to the shorebirds. In addition, signs would be posted to educate visitors about shorebird ecology and the need to preserve and create shorebird habitat around the San Francisco Bay.

Natural Communities.

Coast Live Oak Woodland. The replacement alternatives with the north detour option require construction on Macalla Road which could result in removal or disturbance to the root zone and potential loss of six trees. Post-construction surveys would be conducted to determine the number of trees actually removed or affected. Oaks would be replaced in accordance with the CCSF tree ordinance. A conceptual mitigation plan, specifying goals, replacement ratio, success criteria, and monitoring will be determined in coordination with the San Francisco Public Works Department that has authority under the CCSF tree ordinance. The conceptual plan will be summarized in the Final EIS.

4.10 CULTURAL RESOURCES

This section reports the potential for East Span project alternatives to affect archaeological and historic resources. Mitigation measures discussed in this section are conceptual and subject to SHPO and ACHP review. Views on mitigation measures will also be solicited from interested parties such as Native Americans, preservation organizations, and public agencies, e.g. the City of Oakland, the U.S. Navy, and the City and County of San Francisco.

Section 106 of the National Historic Preservation Act requires agencies to take into account the effects of their projects on historic properties eligible or listed on the National Register of Historic Places. Impacts to resources are assessed by application of the Criteria of Effect and Adverse Effect (36 CFR Part 800.9). An undertaking is considered to have an adverse effect on a historic property when the undertaking may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Pursuant to 36 CFR 800.9, an adverse effect on a historic property includes, but is not limited to: (1) physical destruction, damage, or alteration of all or part of the property; (2) isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's eligibility; (3) introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting; (4) neglect of a property resulting in its deterioration or destruction; and (5) transfer, lease, or sale of the property. SHPO views on project effects are in a letter dated September 10, 1998, located in Appendix G.

4.10.1 Impacts to Archaeological Resources

In applying the Criteria of Effect and Adverse Effect, it appears that six of the ten proposed combinations of replacement alternatives and detour options will have an adverse effect on CA-SFr-04/H; the remaining three (No-Build, N-2 North-South Detour, and N2) will have no effect (see Table 4.10-1).

In many cases, the effects of an undertaking that would be considered adverse may be considered not adverse if appropriate data recovery is carried out. However, if Native American burials may be present in an archaeological site that would be affected by an undertaking, project effects would be considered adverse. Because the potential exists for the prehistoric component of CA-SFr-04/H to contain additional burials, the replacement alternatives and detour options that will physically affect the site have been determined to cause an adverse effect.

When an alternative has been identified, and if that preferred alternative and or detours will adversely affect CA-SFr-04/H, Caltrans will include in a Memorandum of Agreement a commitment to prepare an archaeological research design and treatment plan for pre-construction archaeological data recovery. It will be submitted to the SHPO for approval and to the U.S. Navy for comment pursuant to a previously executed Archaeological Resources Protection Act permit and pursuant to the National Historic Preservation Act. The treatment plan will be made available to

Table 4.10-1 Summary of Effects to CA-SFR-04/H by Alternative

Alternative	Effects to Prehistoric Midden Component of CA-SFR-04/H	Description of Effect
No-Build	No Effect	-
Retrofit Existing Structure	Adverse Effect	Excavation to strengthen Pier YB3 would disturb site.
N-2	No Effect	-
North-North Detour	Adverse Effect	Two piers for eastbound temporary detour structure would disturb site.
North-South Detour	No Effect	-
N-6	Adverse Effect	Supports for both east-and westbound permanent structures would disturb site.
North-North Detour	Adverse Effect	Two piers for eastbound temporary detour structure would disturb site.
North-South Detour	Adverse Effect	One pier for westbound temporary detour structure would disturb site.
S-4	No Effect	Permanent structures would not affect site
North-South Detour	Adverse Effect	Four piers for westbound temporary detour structure would disturb site.

Source: Woodward Clyde, San Francisco-Oakland Bay Bridge East Span Seismic Safety Project Finding of Effect for Archaeological Resources Located in the City and County of San Francisco and the City of Oakland, Alameda County, California, July 1998.

interested Native Americans who are on a list provided by the Native American Heritage Commission. Continued effort will be made to contact interested Native Americans to elicit comments on any cultural concerns.

Monitoring by a Native American will be conducted during all archaeological field investigations. If human remains are located, either Native American or non-Native American, Caltrans will ensure that treatment of the remains will comply with all applicable state and federal laws and regulations, including the Native American Graves Protection and Repatriation Act of 1990 (P.L. 101-601, 25 U.S.C. 3001-3013). California Public Resources Code Sections 5097.98 and 5097.99 require protection of Native American remains which might be discovered and outline procedures for handling any burials found.

In all cases where human remains are discovered, the County Coroner will be notified and, in the case of Native American remains, the state Native American Heritage Commission (NAHC) will be notified. Consultation with a Most Likely Descendant designated by the NAHC will be made as to the extent of respectful treatment and the location for re-interment.

If human remains are discovered during construction, all work will cease in the immediate vicinity of the discovery until the appropriate treatment has been completed.

Mitigation. Consultation will continue with FHWA, SHPO, and Advisory Council on Historic Preservation (ACHP) concerning elibigility and potential for impacts to CS-SFR-04/H. An archaeological research design and treatment plan will be prepared for pre-construction archaeological investigations by Caltrans and submitted to the SHPO for concurrence.

Native American monitoring will be requested at all archaeological field investigations.

If any buried cultural materials are encountered during construction, work will cease in the vicinity of the discovery, and a Caltrans archaeologist will be contacted to evaluate the finds.

4.10.2 Impacts to Historic Architectural Resources

To satisfy the federal requirements for Section 106, Caltrans has prepared a Finding of Effect Report for NRHP listed and eligible resources within the project APE. The Section 106 Criteria of Effect and Adverse Effect were used to determine the effects of the proposed project on historic architectural resources and identify measures to mitigate adverse effects. Caltrans and FHWA are continuing consultation with SHPO concerning determination of effects (see letter in Appendix G from the SHPO concerning determination of effects dated September 10, 1998). Table 4.10-2 presents a summary of effects on Section 106 resources.

No-Build Alternative

The No-Build Alternative would have No Effect on any of the historic architectural resources within the project APE.

Retrofit Existing Structure Alternative

The Retrofit Existing Structure Alternative would modify the existing SFOBB East Span and change views to the Bay from Quarters 1. These changes would result in an Adverse Effect. Potential effects are summarized below.

San Francisco-Oakland Bay Bridge (SFOBB). The Retrofit Existing Structure Alternative would add new piles and pile caps at many piers, construct two new piers at the main span of the cantilever truss and encase several steel piers in concrete. These changes to the existing structure would substantially alter the East Span portion of this historic structure, resulting in a loss of integrity of design and materials. Therefore, the Retrofit Existing Structure Alternative would have an Adverse Effect on the SFOBB.

Caltrans Garage (YBI). This structure would be retained under the retrofit alternative. The Retrofit Existing Structure would have No Effect on this resource.

Table 4.10-2 Summary of Effects on Historic Architectural Resources by Alternative

	Alternative									
			N-2			N-6			S-4	
Historic Architectural Resource	No-Build	Retrofit Existing Structure	Replace-ment Structures	North-North Detours	North-South Detours	Replace-ment Structures	North-North Detours	North-South Detours	Replace-ment Structures	North-South Detours
SFOBB	NE	AE	AE	AE	AE	AE	AE	AE	AE	AE
SFOBB Caltrans Garage	NE	NE	AE	AE	AE	AE	AE	AE	AE	AE
SFOBB Electrical Substation (YBI)	NE	NE	AE	AE	AE	AE	AE	AE	AE	AE
SFOBB Electrical Substation (Oakland Touchdown)	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
SFOBB Key Pier Substation	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Senior Officers' Historic District	NE	AE	NAE	NAE	NAE	NAE	NAE	NAE	NE	NAE
Quarters 1	NE	AE	NAE	NAE	NAE	NAE	NAE	NAE	NE	NAE
Quarters 8	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Quarters 9	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Quarters 10	NE	NE	NE	NAE	NE	NE	NAE	NE	NE	NE
Building 267	NE	NE	NE	NAE	NE	NE	NAE	NE	NE	NE
Building 262	NE	NE	AE	AE	AE	AE	AE	AE	NE	NE

NE – No Effect; NAE – No Adverse Effect; AE – Adverse Effect

Source: Caltrans, SFOBB East Span Seismic Safety Project Finding of Effect Report, July 1998; Parsons Brinckerhoff, September 1998.

Caltrans Electrical Substation (YBI). The Caltrans Electrical Substation at the Oakland Touchdown would be retained. No Effect to this resource would result from implementation of the Retrofit Existing Structure Alternative.

Caltrans Electrical Substation (Oakland Touchdown Area). This structure would be retained under the retrofit alternative. No Effect would result from the project to this building.

Key Pier Substation. No Effect to the Key Pier Substation would result from the Retrofit Existing Structure Alternative.

Senior Officers' Quarters Historic District (includes Quarters 1 to 7 and Buildings 83, 205, and 230). The retrofit of piers YB2 through YB4 on YBI would result in encasement of the existing steel piers in concrete. The resulting walls would substantially impair the view from Quarters 1 across the eastern portion of San Francisco Bay. This would constitute a visual intrusion that would diminish an important aspect of the building's setting, and result in an Adverse Effect.

Quarters 1. Retrofit of piers YB2 through YB4 on YBI, as described above, would result in an Adverse Effect to Quarters 1.

Quarters 8. No work related to the retrofit alternative would cause impacts to Quarters 8. This residence is located downslope from the existing structure within the USCG base. Bay views from the structure would not be modified by retrofit activities. The retrofit alternative would have No Effect on the historic attributes of Quarters 8.

Quarters 9. No work related to the retrofit alternative would result in impacts to Quarters 9. This structure is located on Treasure Island Road facing southeast. Views from the structure to the Bay would not be affected and access to the building would not be modified. The retrofit alternative would have No Effect on the historic attributes of Quarters 9.

Quarters 10. No Effect would result to Quarters 10 from the Retrofit Existing Structure Alternative. This residence is located at an elevation equal to the bridge decks and is screened from view of the bridge by surrounding Oak woodland vegetation. No work related to the retrofit alternative would have an impact on Quarters 10.

Building 267. This building is a garage adjacent to Quarters 10 and is screened from view of the SFOBB by surrounding vegetation. No Effect to this building would result from the retrofit alternative.

Building 262. The retrofit alternative would have No Effect on Building 262. Work to strengthen existing piers on YBI and immediately offshore would not have an effect on the materials or craftsmanship, which make the building significant or diminish the understanding of the relationship of the building to early military occupation on YBI.

The retrofitted structure would cause no permanent change in the noise levels from existing conditions.

Replacement Alignment Alternatives

Alignment alternatives would affect historic architectural resources on YBI and at the Oakland Touchdown in addition to the SFOBB.

Noise does not directly affect historic buildings, but an increase in noise may change the character of a property, diminishing its integrity of setting and feeling. However, none of the new bridge alternatives being considered for this undertaking would result in noise increases at or near the historic buildings. Existing noise levels were measured at six locations within the Officers' Quarters Historic District, as well as in the vicinity of Quarters 8, 9, 10, and Building 262. At all of these locations, the expected noise levels after completion of the new bridge are equal to or lower than the existing noise levels. Noise levels are expected to decrease by six to ten dBA within the historic district. The expected decrease in noise is a result of two factors: (1) the new concrete structures will eliminate radiation of sound through the bridge decks and reduce noise created by vehicles traveling over the expansion joints; and (2) the side-by-side configuration of the new roadways will eliminate the existing condition of traffic noise generated at the lower deck being reflected from the underside of the upper deck.

San Francisco-Oakland Bay Bridge (SFOBB). All of the replacement alternatives would require demolition of the existing East Span. Demolition of this historic structure would constitute an Adverse Effect.

Caltrans Garage (YBI). This contributing structure to the SFOBB would be removed under all replacement alternatives. This would constitute an Adverse Effect.

Caltrans Electrical Substation (YBI). This contributing structure to the SFOBB would be removed under all replacement alternatives. An Adverse Effect would result.

Caltrans Electrical Substation (Oakland Touchdown Area). The electrical substation at the Oakland Touchdown area adjacent to the SFOBB would not be altered or removed. No Adverse Effect would result from dismantling the SFOBB.

Key Pier Substation. The Key Pier Substation would not be altered or removed as a result of dismantling of the SFOBB. No Adverse Effect would result from the removal of the adjacent bridge.

Senior Officers' Quarters Historic District (includes Quarters 1 to 7 and Buildings 83, 205, and 230). As discussed in Chapter 3, there is some question as to the southeastern boundary of the Senior Officers' Quarters Historic District. Should the SHPO concur in a revised district boundary, the conclusions regarding effect may need to be revisited. The discussion of effect below assumes the boundaries as currently delineated by the Navy and concurred with by the SHPO. Alternatives N-2 and N-6 would each place the westbound structure over the southeast corner of the historic district. Alternative N-2 extends approximately 10 meters (33 feet)

north of the existing bridge, while Alternative N-6 extends approximately 12 meters (40 feet) north of the existing bridge, over the historic district. No contributing buildings or landscape features would be altered and no historic characteristics of the district would be diminished. Views from Quarters 1 would be slightly modified by placing a concrete column within the current view and removing the existing steel pier from view. No Adverse Effect would result to the district from either Alternative N-2 or N-6.

Alternative S-4 would shift the new bridge slightly farther away from the historic district than the existing bridge. It would have No Effect on the historic district.

Temporary detour structures required for the replacement alternatives would be in place for up to two years. The north-north and north-south options would place temporary structures over the historic district. Temporary detour structures would require construction of numerous column footings within the district. These temporary detours would have No Adverse Effect on the district because they would be temporary and the affected areas would be restored to their prior condition at the completion of the project.

Quarters 1. See Senior Officers' Historic District, above. Alternatives N-2 and N-4 would have No Adverse Effect on Quarters 1. Alternative S-4 would have No Effect on Quarters 1.

Temporary detour structures required for the replacement alignment alternatives would be in place for up to two years. The north-north detour option would place the westbound temporary structure over Quarters 1 at approximately 37 meters (120 feet) above Quarters 1. The north-south option would place temporary structures adjacent to the south of the residence. Temporary detour structures would require construction of numerous column footings within the viewshed looking out from Quarters 1. These temporary detours would have No Adverse Effect on Quarters 1 because they would be temporary and any affected areas within the footprint of the Quarters 1 NRHP-described boundaries would be restored to prior condition at the completion of the project.

Quarters 8. Quarters 8 would not be affected by any of the replacement alternatives. Predicted changes resulting from replacement alternatives at this residence would be a noise level less than or equal to the existing level. Existing bridge-generated noise levels did not affect determination of eligibility of this building. Therefore, No Effect would result to Quarters 8 from any of the replacement alternatives.

North-north and north-south temporary detour options under all replacement alternatives would avoid Quarters 8. These detour structures would have No Adverse Effect on Quarters 8 because they would be temporary and the affected areas would be restored to their prior condition at the completion of the project.

Quarters 9. Quarters 9 would not be affected by any of the replacement alternatives. Predicted changes resulting from replacement alternatives at this residence would be a noise level less than or equal to the existing level. Existing bridge-generated noise levels did not affect determination of eligibility of this building. Therefore, No Effect would result to Quarters 9 from any of the replacement alternatives.

No detour options under any of the replacement alternatives would affect Quarters 9.

Quarters 10. Quarters 10 would not be affected by any of the replacement alternatives. Predicted changes resulting from replacement alternatives at this residence would be a noise level less than or equal to the existing level. Existing bridge-generated noise levels did not affect determination of eligibility of this building. Therefore, No Effect would result to Quarters 10 from any of the replacement alternatives.

The north only detour options under Alternatives N-2 and N-6 would require construction of column footings on the Quarters 10 property and lowering of the grade of Macalla Road in front of the property. Macalla Road would be lowered to pass under the detour structure, temporarily eliminating the vehicle access to Quarters 10 and requiring special provisions for the protection of Building 267 (garage) (see Section 4.14.2). This would result in a No Adverse Effect because the detour structures would be temporary, grounds disturbed by the construction of column footings would be replanted and restored, and Macalla Road would be restored to its original profile.

Building 267. Building 267, a garage, is a contributing structure to Quarters 10. No Affect would result from replacement alternatives. No Adverse Effect would result to Building 267 under the north only detour options under Alternatives N-2 and N-6 (see preceding section).

Building 262. Alternatives N-2 and N-6 would have an Adverse Effect on Building 262 because replacement structures would pass over the building at approximately 53 meters (175 feet) above the ground in this area. The two side-by-side decks would cover the entire length of the building. The close proximity of the new structures and the permanent shadow they would cast constitute an Adverse Effect by introducing "visual, audible, or atmospheric elements that are out of character with the property."

Mitigation. Measures to mitigate the impacts of the East Span Project on historic properties will be stipulated in Memorandum of Agreement among the U.S. Navy, the FHWA, the SHPO, and the Advisory Council on Historic Preservation. Local governments and historic preservation organizations and interested individuals will also have opportunities to participate in the development of mitigation measures.

The measures listed below represent ideas being developed in stakeholder meetings as possible mitigation and will be reviewed for feasibility. Final mitigation measures will be developed in consultation with stakeholders, the SHPO, the Navy, and the ACHP. The mitigation program for the East Span Project is intended to provide a publicly available record of information and resources regarding the National Register eligible

properties that will be adversely affected through loss or alteration as a result of the proposed project.

- Historic American Engineering Record (HAER) and Historic American Building Survey (HABS) will provide extensive graphic, photographic, and text recordation of the entire bridge, including the East Span. HAER and HABS recordation is being carried out as mitigation for the interim seismic retrofit work.
- A museum exhibit on Bridging the Bay. The exhibit would provide interpretative materials on a number of topics related to the design, construction and social and economic role of the SFOBB.
- A publication on the SFOBB using the HAER documentation
- Rehabilitate the Key Pier Substation for use as an interpretative center commemorating the East Span and Key System, or other use (ongoing operations, staffing, funding, and maintenance would be provided by other parties).
- Rehabilitate the former toll plaza clock and install it in a public place.
- Provide historical markers about the East Span and the Key System at the Oakland Touchdown and possibly on Yerba Buena Island.
- Preserve a portion of the existing East Span at the Oakland Touchdown, should relocation efforts prove unsuccessful (ongoing maintenance would be provided by other parties).
- Commission a large-scale public artwork commemorating the bridge. The work would be placed on exhibit in a local institution.
- Produce a video exploring themes and topics that have not been heretofore widely researched regarding the SFOBB.
- Develop a marketing plan to relocate the bridge. Due to its sheer size, multiple components and double deck configuration, it is not highly likely that marketing efforts to relocate the East Span will prove successful. Efforts will be made to salvage components of the structure for use at multiple locations as an alternative to relocation of the entire structure.
- Maximize public access to information regarding the SFOBB through creation of an internet site and a travelers advisory radio system (a short-range dedicated channel) providing interpretive information to motorists in the proximity of the SFOBB.
- HABS recordation of the Building 262 on Yerba Buena Island.
- A landscaping plan will be developed to screen the concrete-encased pier YB3 from Quarters 1, if the Retrofit Existing Structure Alternative is chosen.
- Provide interpretative displays of Building 262, describing the original use of the building.

4.10.3 Consultation

A Finding of Effect for Archaeological Resources and a separate Finding of Effect for Historic Architectural Resources were submitted to the SHPO in July 1998. The SHPO responded concerning determination of effects in a letter dated August 3, 1998. Caltrans met with Helaine Kaplan Prentice, Staff to the Oakland Landmarks Preservation Advisory Board, on July 3, 1998, to discuss possible mitigation measures. Caltrans also met with Lou Wall (cultural resource coordinator) and Kenn Parsons (base conversion manager) of the Navy on August 25, 1998, to discuss project effects on the

historic properties on YBI. Final mitigation measures will be developed in consultation with stakeholders, the SHPO, and the ACHP.

4.11 SCIENTIFIC RESOURCES

Potential exists for paleontologic resources to be disturbed during in-Bay construction to retrofit existing footings and piers for the Retrofit Existing Structure Alternative and construct new footings and piers for the replacement alignment alternatives.

Mitigation. Should any paleontologic resources be discovered during in-Bay construction, Caltrans would ensure that provisions of the California PRC Section 5097.6 are implemented. Any discovered remains would be evaluated by a professional paleontologist and deposited at an appropriate scientific repository such as the Paleontological Museum of the University of California, Berkeley.

4.12 UTILITIES RELOCATION

TI and YBI are served by utilities installed on the existing SFOBB or by underwater conduits placed on the Bay floor. The existing East Span carries the backup water supply for the islands from the Oakland Touchdown area. The primary supply is on the West Span. The water, supplied by the EBMUD, is piped through a Navy-owned 305-millimeter (12-inch) diameter cement-lined steel water pipe attached to the existing East Span. The CCSF has assumed management of the islands from the Navy under a Base Caretaker Agreement and requested that the water source be maintained. Utilities on the existing East Span would be retained under the No-Build and Retrofit Existing Structure Alternatives but would be relocated, potentially to the new structures, under the replacement alternatives.

A major EMBUD sewer outfall line parallels the bridge approach to the south. Other EBMUD facilities include an effluent pump station near the toll plaza, a dechlorinization facility on the Oakland Touchdown south of the existing East Span and an outfall drop structure at the western end of the Touchdown. The outfall, extending into San Francisco Bay for a distance of approximately 1,524 meters (5,000 feet), is located to the south of the existing East Span and immediately north of the Alternative S-4 alignment. The submarine outfall pipe is placed just below the Bay floor. The S-4 Alternative crosses the buried outfall line on the Oakland Touchdown. No other alternatives would have an impact on the sewer outfall.

Electrical power is provided to the islands via a Navy-owned 34.5 kilovolt submarine cable connected to the Davis Substation located at the Fleet Industrial Supply Center (FISC) in Oakland on Port of Oakland property.

Natural gas is provided to the islands by a 254-millimeter (10-inch) diameter high pressure submarine gas main from Oakland.

Telecommunications service is provided to TI and YBI via a conduit system located on the West Span of the SFOBB. Pacific Bell has fiber optic facilities on both the East and West Spans of the SFOBB.

Utilities located on the existing East Span would be maintained under the No-Build and Retrofit Existing Structure Alternatives, but would be relocated under the replacement alternatives. Timing of utility relocations would be set to avoid interruption of service when portions of the existing span would be removed for connection of temporary detour connector ramps.

Submarine utilities would be avoided to the greatest extent possible. Coordination with utility providers has been initiated to verify locations of submarine utilities and to identify potential conflicts. Coordination with utility providers will continue through the final design process. If utilities cannot be avoided, they will be relocated or protected in place (e.g., placing a concrete slab over the utility or encasing it in a conduit).

4.13 ENERGY

4.13.1 Analysis Methodology

This section assesses the impact of the SFOBB alternatives on transportation-related energy consumption in the study area for year 2002. The analysis estimated the total amount of indirect energy (construction) expected to be consumed by each of the alternatives. Because the alternatives would not increase capacity over the existing facility, direct or operational energy was not analyzed for this project.

Indirect energy effects involve the one-time, non-recoverable energy costs associated with construction of roadways and transportation-related facilities such as bridges. Facility-related energy accounts for energy consumed during the following activities:

- Production of construction materials used in new construction and maintenance;
- Construction of the various build alternatives, including pavement and structures.

Construction of the build alternatives for the SFOBB would be a large-scale effort, with many issues, techniques, and methods. Particular issues associated with this project include work to be conducted within the water, access to materials (either by land or water), demolition activities, dredging activities, pile driving, and others. For a discussion of the construction scenario, see Chapter 2.

The indirect energy analysis was conducted using the Input-Output Method, a standard Caltrans method outlined in the Caltrans 1983 Energy and Transportation Systems manual. This method was used to convert the 2002 construction dollars, identified in Table 2.4-1 of this document, into energy consumption.[10] Although the cost of fuels vary from region to region, this is an appropriate method for analyzing construction energy when limited engineering information is available.

Energy is measured in British thermal units (Btus)[11]. For this analysis the Btus were converted to the equivalent barrels of crude oil for comparison of alternatives. For purposes of comparison, 5.3 million barrels is approximately equivalent to the total daily amount of motor gasoline consumed in the United States or total gasoline sales in one week in California.

[10] A Btu/$ conversion of 70,100 Btu/$ is based on 1977 construction costs. In order to use the factor of 70,100 Btu/1977 Construction Dollar, a factor of 3.14 was used to convert 2002 construction dollars to 1977 construction dollars. A conversion factor of 70,100 Btu/1977 Construction Dollar is based on the construction of an interchange. The actual amount of energy consumed may be larger but no database of information for a facility of this type was identified. This estimate provides for a comparison of alternatives.
[11] One Btu is the quantity of energy necessary to raise one pound of water one degree Fahrenheit.

4.13.2 Impacts

The indirect energy consumption for construction-related activities for each alternative is summarized in Table 4.13-1. Over 90 percent of the energy expended on each of the build alternatives would be the result of structure and roadway construction. Other elements, such as pedestrian/bicycle paths and lighting would account for a very small portion of the total indirect energy consumption.

No-Build Alternative

There would be no construction costs associated with the No-Build Alternative and, therefore, no expenditure of indirect energy.

Retrofit Existing Structure Alternative

Based on 2002 construction costs of $900 million dollars, the Retrofit Existing Structure Alternative would consume approximately 20,293 billion Btus or 3.5 million barrels of oil during construction.

Replacement Alternative N-2

Based on 2002 construction costs of $1,360 million dollars, the Skyway Design Option would consume approximately 30,362 billion Btus or 5.23 million barrels of oil during construction. This design option would not include lighting; therefore, no indirect energy would be expended for this element.

The Cable-Stayed Main Span Design Option would have a construction cost of $1,560 million dollars. The indirect energy consumption for this alternative would be approximately 34,827 billion Btus or 6.00 million barrels of oil. This alternative would include all facility elements described above.

The Self-Anchored Suspension Bridge Design Option would have a construction cost of $1,640 million dollars. Construction energy consumption would be approximately 36,613 billion Btus or 6.31 million barrels of oil. This alternative would include all facility elements described above.

Replacement Alternative N-6

With a 2002 construction cost of $1,350 million dollars, the Skyway Design Option would consume approximately 30,139 billion Btus or 5.20 million barrels of oil during construction. This alternative would consume slightly less energy, compared to Replacement Alternative N-2.

The Cable-Stayed Main Span Design Option would have a construction cost of $1,550 million dollars. The indirect energy consumption for this alternative would be approximately 34,604 billion Btus or 5.97 million barrels of oil. This alternative would consume slightly less energy, compared to Replacement Alternative N-2.

The Self-Anchored Suspension Bridge Design Option would have a construction cost of $1,650 million dollars. Construction energy consumption would be approximately 36,836 billion Btus or 6.35 million barrels of oil. This alternative would consume slightly less energy, compared to Replacement Alternative N-2.

Table 4.13-1 Indirect Energy Analysis

Description	Alternatives									
	Retrofit Existing	Skyway			Cable-Stayed Main Span Design Option			Self-Anchored Suspension Bridge		
		N-2	N-6	S-4	N-2	N-6	S-4	N-2	N-6	S-4
2002 Construction Costs[a] (millions)	$900	$1,360	$1,350	$1,400	$1,560	$1,550	$1,570	$1,640	$1,650	$1,640
1977 Equivalent Construction Costs (millions)[b]	$286.6	$433.1	$429.9	$445.9	$496.8	$493.6	$500	$522.3	$525.5	$522.3
TOTAL BTUS CONSUMED (billions)[c]	**20,293**	**30,362**	**30,139**	**31,255**	**34,827**	**34,604**	**35,050**	**36,613**	**36,836**	**36,613**
TOTAL BARRELS OF OIL CONSUMED[d]	3,464,000	5,235,000	5,196,000	5,389,000	6,005,000	5,966,000	6,043,000	6,313,000	6,351,000	6,313,000

Notes:

a. Construction costs are derived from Table 2.4-1 of this document.
b. In order to use the factor of 70,100 Btus/1977 Construction Dollar, factor of 3.14 was used to convert 2002 construction dollars to 1977 construction dollars.
c. Construction dollars converted to Btus based on construction energy factor of 70,100 Btus/1977 construction dollar (Caltrans 1983).
d. Based on a conversion factor of 5.8 million Btus/Barrel of crude oil.

Source: Parsons Brinckerhoff, September 1998.

Replacement Alternative S-4

Based on a 2002 construction cost of $1,400 million dollars, the Skyway Design Option would consume approximately 31,255 billion Btus or 5.39 million barrels of oil to construct. This alternative would consume slightly more energy, compared to either Replacement Alternatives N-2 or N-6.

The Cable-Stayed Main Span Design Option would have a construction cost of $1,570 million dollars. The indirect energy consumption for this alternative would be approximately 35,050 billion Btus or 6.04 barrels of oil. This alternative would consume slightly more energy, compared to either Replacement Alternatives N-2 or N-6.

The Self-Anchored Suspension Bridge Design Option would have a construction cost of $1,640 million dollars. Construction energy consumption would be approximately 36,613 billion Btus or 6.31 million barrels of oil. This alternative would consume slightly more energy, compared to either Replacement Alternatives N-2 or N-6. This alternative would have the highest indirect energy consumption of any of the alternatives.

The following design considerations would reduce the amount of indirect energy consumed, but are not anticipated to have a significant overall reduction. These design considerations applied during the planning and construction phases would reduce the amount of indirect energy consumption. Therefore, design and construction of build alternatives would:

- Maximize the use of recycled materials;
- Maximize the use of energy-saving technologies;
- Maintain the performance of construction equipment; and
- Recycle materials used in construction as much as possible and within design specifications.

4.14 TEMPORARY EFFECTS DURING CONSTRUCTION ACTIVITIES

This section describes potential temporary impacts of project alternatives that may occur during project construction. Because the No-Build Alternative would not involve any project-related construction, discussions are focused on the build alternatives including the Retrofit Existing Structure and Replacement Alternatives N-2, N-6, and S-4. In general, the potential for disruptive construction effects would correspond to the type and location of activities proposed in each construction stage, and the duration of the overall construction process associated with each alternative.

The Retrofit Existing Structure Alternative is estimated to require about 48 months to construct. For the replacement alternatives, the estimated total number of months required for bridge completion is 51 months, which includes construction of the over-water sections (main span and skyway), and construction of the detour structures on YBI. It is estimated that the entire project will be completed in 57 months, which includes dismantling the existing East Span.

4.14.1 Community Impacts

Potential construction period impacts to residents, government facilities at YBI, and businesses at the Oakland Touchdown area are addressed in the following section.

Neighborhoods and Businesses

During construction, motorists and pedestrians on YBI and the Oakland Touchdown area would experience some delays and detouring. Some streets would be closed during construction and others would be subject to periodic lane closures (See Section 4.14.2, Transportation Effects During Construction). Further delays would occur as construction trucks and equipment use local streets.

Construction-period Safety and Security

Safety and security issues associated with the construction of the East Span Project include potential disruption of traffic movements, including potential for obstruction of access to YBI and Oakland Touchdown governmental structures and Quarters 1-10 on YBI by emergency and law enforcement vehicles. Heavy vehicle movements, possible hazardous wastes excavation and transport, and construction site activity would also create potential safety concerns.

Construction Employment

Economic activity generated by the proposed build alternatives is anticipated to benefit the Bay Area region and would also follow the labor and material markets for highway bridge construction. Refer to Section 3.1 for a complete discussion of employment-generation effects of the project.

Mitigation.

Community
Best construction management practices would be in place to ensure the safety of construction workers, local employees, and residents during construction of the build alternatives. Fencing and lighting of construction and staging areas, recognized safety practices for the utilization of heavy equipment, and the movement of construction materials would be implemented to avoid accidents. During construction, Caltrans would require that the project contractor be responsible for job-site safety and security. Detours, lane blockages, and truck entrance locations would be well signed.

The contractor would apprise police, fire, and other emergency response agencies of construction activities, detours, and road blockages throughout the construction process.

Safety and Security
The public would be alerted about detours, lane blockages, and truck entrances. These locations would be well signed.

4.14.2 Transportation Effects During Construction

Construction activities proposed under all build alternatives would temporarily affect transportation facilities within the project area, as described below.

Traffic Disruptions
Construction activities under all build alternatives would result in some traffic disruption on I-80 and temporary bridge closures during off-peak travel times. Construction could also affect local streets on YBI and the Oakland Touchdown area. In addition to temporary traffic disruptions (closures and detours), construction traffic would be noticeable on area roadways and could contribute to localized congestion from time to time.

During the final stage of construction of replacement alternatives, the detour structures on YBI would be connected to the YBI Tunnel portal. This construction would require closure of traffic lanes on the SFOBB during off-peak travel times. During these closures, traffic would be directed to use either the Hayward-San Mateo or Richmond-San Rafael bridges.

In general, construction of the Retrofit Existing Structure Alternative would result in greater and more frequent disruptions to mainline freeway traffic, compared to the replacement alternatives, because construction would occur while the bridge is open to traffic. The replacement alternatives would, however, have greater traffic impacts to local streets and potentially create more delays as "rubbernecking" drivers on the existing SFOBB watch ongoing construction on the neighboring replacement spans. This can be mitigated somewhat by using some type of temporary visual barrier. More specifics regarding construction-period traffic effects are presented below.

Yerba Buena Island. Under the Retrofit Existing Structure Alternative, off-peak lane closures would be necessary during the construction period. In addition, the East Span would need to be closed while the new piers are connected to the cantilever section. Construction activity would be scheduled to conform to the lane closure charts.

Replacement alternatives could require the closure of the eastbound right-hand off-ramp and the westbound right-hand on-ramp on the east side of the island for a period of 18 months during construction. Access to the SFOBB would continue by the remaining eastbound left-hand off-ramp onto Treasure Island Road and the right-hand westbound on-ramp from Treasure Island Road.

For all three of the replacement alternatives, construction of bridge pier foundations on YBI would affect a portion of Macalla Road, the undercrossing connecting Treasure Island Road with Macalla Road, and the entrance to the USCG Station.

Depending on the detour alignment selected, the foundations and piers for the temporary detour structures could block the undercrossing connecting Macalla Road and Treasure Island Road, as well as Macalla Road and the entrance to the USCG Station.

Construction of the Retrofit Existing Structure and replacement alternatives would increase traffic volumes on YBI by introducing construction-related traffic. Slow-moving heavy trucks would operate on Macalla Road, creating delays for other traffic. This impact would be most severe for the first two years of construction when the labor force is the largest.

Construction of the replacement alternatives would take place on the eastern side of YBI, the parade grounds, and the flat area beneath the existing SFOBB might be used by a contractor as a construction staging area. Unloading and stockpiling of construction equipment and bridge components are likely uses.

Under the replacement alternatives, dismantling of the existing East Span would include removal of portions of the upper deck using the existing bridge. Some materials would be removed by truck from YBI, increasing traffic on local streets. Heavy trucks on Macalla Road may conflict with other vehicles due to the narrow width and steep grades of the roadway. Truck traffic on Macalla Road would be regulated by flaggers to ensure that there are no conflicts between oversized vehicles using the road. Heavy construction vehicles would also likely cause damage to the pavement on Macalla Road. Under all the proposed alternatives, local streets would be repaired following construction.

Because additional traffic using YBI during construction may exceed the capacity of the freeway ramps, Caltrans would require that contractors limit the number of vehicles on the island. Construction worker access using private cars would be limited, and travel on the island restricted to essential vehicles. Contractors would be required to provide alternate means of transportation for workers.

The former parade grounds located east of Quarters 1 may be used for construction staging, resulting in the temporary loss of 315 informal parking spaces. The temporary loss of parking in this lot may affect the accessibility or use of existing facilities on the island, including the Nimitz House. Large-scale special events may experience parking shortages. On-street parking adjacent to Quarters 1-7 would remain open during construction.

Temporary restriction of access to Building 267, the garage at Quarters 10, would be required under the north replacement alternatives, north-north temporary detour structures option. Vehicular access blockage to the garage would result from the construction period lowering of the grade of Macalla Road adjacent to Quarters 10. As necessary, the project design would include temporary replacement parking and a temporary walkway from the parking area to Quarters 10. The replacement parking would be located as close to Quarters 10 as feasible, such as near Building 240.

Oakland Touchdown Area.. Alignment Alternatives N-2 and N-6 would require closing the access road on the north side of I-80 during construction, eliminating vehicle access to the shoreline west of Radio Point Beach. Alternative S-4 would displace a portion of Burma Road from about the location of the billboard west to the end of the Oakland Touchdown area. The road is not required for access to any of the buildings in this area. Closure and relocation of Burma Road would not affect traffic circulation.

Higher volumes of heavy vehicle traffic anticipated during construction of the Retrofit Existing Structure Alternative and the replacement alternatives may slightly affect traffic and transit operations. The increased number of trucks on Maritime Street, for example, could potentially cause minor delays to traffic and to AC Transit Transbay Route A and Local Route 13. The delay would be roughly equivalent to a missed signal cycle and would be within the range of normal traffic conditions, particularly during peak commute hours. No mitigation is recommended for this minor potential delay.

Marine Operations

Under the Retrofit Existing Structure Alternative, retrofit work in shallow water west from the Oakland Touchdown area would be completed from construction trestles. A temporary trestle would be constructed on either side of the existing bridge, with cross-trestles at each pier to provide construction access around the piers. Work would be done from barges where water depths can accommodate standard draft barges (waters depths of 3.66 meters [12 feet] or greater). Construction activity around the existing piers and for the new piers would also require barges to support large-scale construction equipment. The navigation channel would be constricted at times while the barges are in place to retrofit Pier E2 and construct new piers E2A and E2B. The two new piers would ultimately narrow the navigation channel in accordance with USCG regulations.

Under the replacement alternatives, the nature, duration, and location of marine construction activities would continually vary due to in-water activities associated with construction of the main span and skyway and dismantling the existing East Span. The presence of barges, other construction vessels, and temporary falsework would restrict

the navigation channel. Additionally, temporary closures of portions of the navigational channel could occur during critical construction points due to overhead hazards.

Mitigation.

USCG Station Access To maintain access to the USCG Station, Caltrans would require that the contractor construct a detour around the pier foundations to keep Macalla Road open at all times. This detour would be steeper than the existing road and would require removal of some trees adjacent to the garage (Building 267) at an existing residential unit (Building 10). Construction of the detour may require a cut into the uphill slope.

Caltrans would require the contractor to stage the construction of the pier foundations blocking access to the USCG Station so that one of the three possible entrances to the station would be open at all times. Piers would be constructed in a sequence to ensure that access to the USCG station is maintained without interruption.

Foundations and piers for the temporary detours would be constructed to avoid the surface roadways, where feasible.

Following construction, steps would be taken to restore areas affected by construction of detours and temporary access to the USCG facility. Macalla Road would be restored to its original grade to the extent feasible, trees would be replanted, slopes would be re-graded to approximate natural contours.

Construction Vehicle Traffic
Motor vehicle detours would be constructed and flaggers employed to ensure motorist safety in the construction zone. Wide and oversized loads would be restricted to barges, where possible.

Parking
Caltrans would establish a maximum number of workers driving and parking on the island based on the capacity of the existing SFOBB ramps, space needed for construction staging, and concerns of the Navy and USCG. In general, parking would be restricted to essential vehicles.

Marine Traffic
Caltrans would consult with the USCG to implement a vessel warning system when construction vessels are placed in the water within the bridge construction zone. Caltrans would obtain a permit to modify the existing bridge or construct a replacement bridge from the USCG pursuant to Section 9 of the Rivers and Harbors Act. Notification to mariners and other requirements would be specified in the bridge permit.

4.14.3 Construction-period Visual Changes

All construction activities, whether for seismic strengthening proposed under the Retrofit Existing Structure Alternative or for the replacement alternatives, would involve the use of barges, heavy equipment, stockpiles of soils and materials, and other visual signs of

construction. While noticeable to residents on YBI and others in the vicinity, these short-term visual changes would not substantially alter the character of the Bay or the communities on either side. These short-term visual changes do not include the long-term impacts of the clearing and grubbing operations. Approximately 370 trees on the eastern part of YBI will have to be removed to provide staging areas and clearances for heavy equipment. This visual impact will be mitigated as discussed in Section 4.3.4.

Residents of the bachelors' enlisted quarters and the USCG officers' housing as well as users of YBI would experience the most noticeable visual changes during the construction period. Flat areas on YBI are expected to be used as a construction staging area. Activities at this location may block Bay views from Quarters 1-7. Retrofit of existing piers on YBI under the Retrofit Existing Structure Alternative could require temporary structures, such as scaffolding, that would interfere with existing views. New piers constructed under the replacement alternatives would add similar temporary structures.

Replacement Alternatives would require the placement of temporary detour structures on YBI (see temporary detour drawings in Appendix A). These structures would be in place for approximately 20 months. Columns, approximately 2 meters (6.5 feet) in diameter, would be constructed to support these detour structures. The number of columns to be placed on YBI would range from 59 for the S-4 North-South detour structures to 91 columns for the N-2 North Only detour option. The S-4 Replacement Alternative would place from 35 to 60 temporary support columns on YBI. (See temporary detour drawings in Appendix A). Placement of the temporary columns would likely restrict views from YBI and would be visible from close- and moderate-range views to the east side of YBI.

Each of these detour options would result in different impacts to the local vegetation and, consequently, the appearance of YBI. See Section 4.3.4 for a more detailed description of the effects of each alignment.

Nighttime construction activities would involve the use of lighting equipment, which could cause glare, potentially affecting residents in the immediate vicinity. To reduce glare from lighting used during nighttime construction activities, Caltrans would require project contractors to direct lighting onto the immediate area under construction only and to avoid shining lights towards residences and on water and marine traffic.

For replacement alternatives, temporary detour structures would remain in place for the shortest duration possible. Dismantling of the temporary structures would take place as soon as possible after opening the new bridge to traffic. These design considerations will reduce visual impacts to the minimum possible; no mitigation is recommended.

4.14.4 Construction-period Air Quality

During some stages of project construction, the Retrofit Existing Structure Alternative and the replacement alternatives would contribute to area emissions of air pollutants. The largest sources of anticipated pollutants would be dust generated by excavation, grading, and other ground-disturbing activities on YBI and the Oakland Touchdown and exhaust emissions from equipment and marine vessels. All construction-related

emissions would be temporary and vary from day to day, depending on the type of work being done. Construction-related emissions would also be experienced at different locations during the construction process, depending on the area(s) under construction at any one time and the distance to likely receptors. Because of the changing nature of these conditions (i.e., construction activity, construction location, and distance to receptors), an estimate of "total" construction emissions is not possible.

Best management practices (BMPs), as specified in Caltrans' Standard Specifications (e.g., watering exposed soil surfaces, covering trucks transporting dust-producing material leaving or entering a construction site, reducing construction vehicle travel speeds on unpaved surfaces, and maintaining equipment per manufacturers' specifications), would effectively reduce emissions during construction. Caltrans will require the project contractor to conform with all air pollution rules, regulations, ordinances, and statutes. Based on the requirement that these BMPs be included in all contract specifications, no mitigation is proposed.

4.14.5 Construction-period Noise and Vibration

Construction Noise

The Retrofit Existing Structure and replacement alternatives would result in intermittent and varying levels of construction noise. Average noise levels associated with various construction phases where all pertinent equipment is present and operating at a reference distance of 15 meters (50 feet) are:

Ground Clearing	84±6 dBA
Excavations	89±6 dBA
Foundations	78±3 dBA
Erection of Structures	85±5 dBA
Finishing (i.e., Paving)	89±6 dBA

(Ref: Bolt, et. al. for the Environmental Protection Agency, 1971)

Most construction activity related to this project would be associated with the last four categories (which are the noisiest operations). Because of vehicle technology improvements and more strict noise regulations enacted during the last 26 years, this analysis will use the minimum noise level shown above. This information indicates that the overall noise level generated on a construction site could reach a noise 83 dBA at a distance of 15 meters (50 feet). Noise levels generated by construction equipment (or by any "point source") decrease at a rate of approximately six decibels (dB) per doubling of distance away from the source. For instance, at a distance of 60 meters (200 feet) from a noise source, the noise levels would be about 12 dB lower than at the 15-meter (50-foot) reference distance. At Quarters 8, the nearest residence (approximately 50 meters [164 feet] away from the construction area), the noise level resulting from typical construction activities would be approximately 73 dBA L_{eq}. This is one dB higher than existing peak-noise-hour traffic noise on the existing East Span at this location and one dBA is not a

perceptible change. Therefore, the noise from construction activity, although short-term in nature, would be only slightly higher than measured and modeled ambient daytime noise levels at this location. At a distance of 100 meters (328 feet), the noise from regular construction activities would be approximately 67 dBA L_{eq}; at 200 meters (656 feet), construction noise levels would be approximately 61 dBA L_{eq}; while at 400 meters (1,312 feet), the noise levels would be approximately 55 dBA L_{eq}, or well below ambient traffic noise levels. Except for construction equipment and material staging areas, construction activities and associated noise would move along the project route as construction proceeded, and thus these levels would vary and be intermittent.

Pile driving during construction would generate noise that is unique in terms of noise level, audible characteristics, and time pattern. The higher levels of pile driver noise, which are maximum levels (L_{max}) of approximately 105 dBA at a distance of 15 meters (50 feet), consist of very-short-duration impact sounds (a "bang" or "clang" noise) concentrated during a 10- to 30-minute period while an individual pile is being driven. These impact sounds attenuate with distance such that the maximum levels will be 94 dBA at 50 meters (164 feet) (i.e., the nearest residence).

Construction noise is unavoidable and could adversely affect some nearby USCG residents during construction activity periods. However, the impact would be temporary and limited to the time of the construction in any one location (except near the staging areas as noted above).

Traffic Noise During Construction

To allow for continued utilization of the SFOBB during construction, temporary detour structures would be constructed at YBI and at the Oakland Touchdown area. It is anticipated that these temporary detour structures would be in use for approximately one year. These temporary detour structures vary in design and configuration depending upon the alternative.

Based upon the results of the noise modeling for the replacement alternatives (N-2, N-6 and S-4), any one temporary detour alignment is not expected to cause an audible (generally, three decibels or greater) change in noise levels compared with another detour alignment. Modeled noise levels at a given receptor generally vary by one decibel or less when comparing the N-2, N-6, and S-4 alignments and would generally not be perceptible.

Although noise levels would be relatively similar, a south detour alignment would affect 60 USCG residential units approximately 60 meters (197 feet) from the temporary structure, while a north detour alignment would affect seven residential units (Quarters 1-7) located approximately 150 meters (492 feet) from the temporary structure.

Abatement.

Construction Period Noise

All construction equipment would be required to conform to the provisions in Section 7-1.01I of the latest edition of Standard Specifications to minimize noise from construction activities, such as maintaining equipment mufflers in proper operating order. The

contractor will be required to comply with local noise control ordinances, to the extent practicable.

Caltrans would require contractors to install and use sound-attenuating fabric shrouds around the hammer/pile impact area of pile driver equipment during pile driving to the extent possible. Over-water construction sites may not be suitable for this technique. Where practicable, pile holes would be pre-drilled to reduce effects of pile driving.

Construction Vibration

Normal project construction activities would not generate significant levels of vibration. Pile driving, if required during the construction phase of the project, could produce ground-borne vibration levels that might be perceptible within approximately 200 meters (656 feet) of the pile-driving activity. Ground-borne vibration levels at distances of approximately 60 meters or more will not result in adverse effects. Pile driving very close to structures, within 18 meters (60 feet), can cause structural damage due to displacement of soil and resulting lateral movement. Vibration from pile driving occurring within 33 meters (110 feet) can cause architectural and structural damage to some buildings, especially unreinforced or older buildings such as Building 262.

The Retrofit Existing Structure Alternative would not require pile driving near buildings on YBI or at the Oakland Touchdown. No impacts would occur and no abatement is proposed.

Replacement Alternatives may require pile driving. Potential for impacts to structures on YBI and at the Oakland Touchdown area is discussed below.

Replacement Alternative N-2. Pile driving may be required to construct the easternmost pier on YBI. Should this construction method be employed, pile driving would occur within approximately 25-30 meters (82-100 feet) from Building 262. This structure has been determined to be eligible for the National Register of Historic Places. No pile driving is assumed to be required at the Oakland Touchdown.

Replacement Alternative N-6. No buildings are within the ranges for potential impact due to pile driving on YBI or at the Oakland Touchdown.

Replacement Alternative S-4. No buildings are within the ranges for potential impact due to pile driving on YBI or at the Oakland Touchdown.

Explosives

Blasting may be required for in-Bay construction of replacement alternatives, cable stayed and self- anchored suspension design variations. The in-Bay blasting and rock excavation would be used to create a rock bench in the sloping bedrock off YBI for the main span tower foundation. A rock bench would be excavated at the tower site. Assuming the rock bench is to be located at an average elevation of approximately -22 meters (-72 feet), the rock blasting would take place from -10 meters to -25 meters (-33 feet to –82 feet) below water level.

The most economical and efficient method of blasting the rock would be to drill all the blast holes and set off one large explosion using millisecond delays. The rock bench is required for drilling the cast-in-drilled-holes piles. Approximately 25 footings would need to be drilled into the rock bench to support the main tower. This would require the removal of approximately 10,000 cubic meters (353,100 cubic feet) of rock. Using an average of seven pounds per cubic-meter of drilled rock, it is estimated that approximately 31,818 kilograms (70,000 pounds) of explosive would be required. The explosives that are normally used in consolidated rock formations are water gels, which can be pumped through a square shaft that drives the drilling bit. If this one explosion generates shock waves that are not acceptable, the area could be divided into two or three sections and then separate drilling and blasting of each section could be possible; however, this requires added time and expense. If the excavation area is divided into two or more sections, then the recommended procedure would be to drill, blast, and excavate the first section, before drilling the next section. This procedure would have several explosions spaced days or weeks apart, depending on the amount of time required to drill, blast, and excavate each section. The total duration of the blast would be 500 milliseconds (one-half second), assuming 50 millisecond delays between drill hole rows for 10 rows. This total time would apply to one explosion or to three separate explosions, as the number of rows would not change. It is also recommended that all overburden, approximately 2 to 5 meters (7 to 16 feet) deep, be excavated down to the rock layer prior to starting the drill and blast operations.

Building 262 sits below a rock bluff at the eastern tip of YBI. The N-2 and N-6 replacement alternatives propose constructing one of the bridge piers on the bedrock on this rock bluff, approximately 25-30 meters (82-100 feet) from Building 262. Explosives may be utilized during foundation construction for this pier.

Abatement. Caltrans will require project contractors to use cast-in-drilled-hole piles if feasible when working at the easternmost pier near Building 262 and to monitor the building during periods of pile driving. The monitoring would consist of, at a minimum, photographic documentation of the building prior to pile driving to determine if there is damage. Sensors could also be installed to monitor vibration. If the monitoring indicates there has been damage to the building, the building will be repaired consistent with the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.

If explosives are used, a detailed analysis will be conducted prior to blasting to ensure that noise and vibration is minimized. Measures would be developed to control distribution of rock debris. Notifications and conditions would be developed in consultation with the California Department of Fish and Game and Notice to Mariners required by the USCG.

4.14.6 Hazardous Wastes

The potential for encountering pre-existing hazardous wastes is present during any construction project, particularly in the East Span Project area where hazardous wastes sites are known to exist. Hazardous wastes impacts would occur if construction workers or members of the public were exposed to hazardous wastes during grading

and excavation activities, or if the likelihood of hazardous waste migration were increased by construction activities.

Potential sources of contamination have been identified within all of the project alternative alignments. Areas known or likely to contain contaminated soil and/or groundwater were identified in Section 3.6 of this report.

Mitigation. Demolition of all structures, especially the existing SFOBB, would include procedures for the identification, abatement, handling, and disposal of lead-based paint and asbestos, as well as worker health and safety. All procedures would be consistent with Caltrans' guidelines and all federal, state, and local laws and regulations.

Workers performing activities on site that may involve contact with contaminated soil or groundwater would be required to have appropriate health and safety training in accordance with federal regulations (29 CFR 1910.120), as well as state regulations (CCR Title 8 G1505192). In order to reduce the risk of exposure, a Worker Health and Safety Plan would be prepared by a Certified Industrial Hygienist (CIH). The Health and Safety Plan would include provisions for:

- Conducting preliminary site investigations and analysis of potential job hazards;
- Personal protective equipment;
- Safe work practices;
- Site control;
- Exposure monitoring;
- Decontamination procedures; and
- Emergency response actions.

The plan would specify mitigation of potential worker and public exposure to airborne contaminants by incorporating dust suppression techniques in construction procedures. Procedures would be in place to handle contaminated soils.

4.14.7 Water Resources and Water Quality

The project could have potential adverse impacts on water quality related to construction activities. These include, but are not limited to: exposure of soils potentially resulting in erosion impacts to receiving waters; footing excavations for pier foundation resulting in possible groundwater contamination; potential surface water impacts from dredging and dewatering operations, concrete pouring, and washout activities, management and application of chemical products; construction activities performed on barges; and the potential for accidental spills from construction equipment and materials. Additional construction-related impacts are associated with the dismantling of the existing East Span, which may include discharges of waste material, accidental spills, and resuspension of bottom sediments. Measures similar to those taken during construction will be taken to address these impacts.

The area occupied by this project is under the jurisdiction of the San Francisco Bay Regional Water Quality Control Board; therefore, National Pollutant Discharge

Elimination System (NPDES) Permit No. CAS029998 applies to the project facilities during construction. The NPDES permit requires that a Storm Water Pollution Prevention Plan (SWPPP) be prepared for any construction project that disturbs an area greater than five acres or for any project that is located within or near a water-related sensitive environment.

Construction work would include dredging, dewatering, concrete pouring, welding, paint and paint removal, and other activities that have the potential to impact water quality. Preventing these impacts may be difficult due to the complex site conditions, with limited space and several constraints. However, controls in the SWPPP would be used to minimize water quality effects to the maximum extent practicable. The SWPPP would have a plan for responding to and managing accidental spills during construction, a plan for the management of chemical and/or hazardous materials used during construction, a plan for management and performance of all construction activities conducted over water and from barges to minimize the potential for accidental releases, a plan for the management of excavation activities to minimize or eliminate the potential for groundwater contamination resulting from such activities, and a plan for the management and disposal of all pumped water and dredged materials. The SWPPP would also address overall management of the project, such as Best Management Practices for concrete pouring, the application of concrete curing compounds, material storage, equipment fueling, concrete washout, and stockpiles. The transport of materials and equipment use would also be covered.

The SWPPP would describe all erosion control measures to be taken by the contractor as well as all Best Management Practices to be implemented to control and prevent to the Maximum Extent Practicable the discharge of pollutants to surface waters as well as groundwater. Erosion control measures may include, but not be limited to, the installation of silt fences on cut slopes, around drainage inlets, and any drainage path; placement of hay bales, mulching; erosion control blankets; and hydroseeding.

Since the dismantling work is being performed under a separate contract, a separate SWPPP specific for the demolition work will be prepared. The SWPPP will address specific dismantling activities and BMPs to be implemented to minimize the discharge of pollutants associated with these activities. Similar to the SWPPP prepared for the construction of the new structure, this SWPPP will have a plan for managing and responding to accidental spills and discharges of waste material.

4.14.8 Natural Resources

Impacts to natural resources could result from construction activities on land at YBI and the Oakland Touchdown area and in open water. Impacts to natural resources on land include in-Bay construction work or temporary disturbance of habitats for special status species, wetland areas, or other special aquatic sites.

Retrofit Existing Structure Alternative

Special Status Species. Temporary impacts associated with construction activities would occur to the American peregrine falcon, double-crested cormorant, chinook salmon, steelhead, green sturgeon, and longfin smelt. A summary of mitigation measures, which are described in the 1996 Biological Assessment prepared for the retrofit alternative and in the 1997 Biological Opinion, is provided following the impact discussion.

American Peregrine Falcon. The seismic retrofit work may cause temporary impacts to the peregrine falcons during their reproductive cycle. The peregrine falcon pairs are habituated to two known nest sites, located on the East Span at Pier E2. Construction activities on the East Span could induce defensive reactions by the peregrines during the nesting season, which can adversely affect breeding success by diverting adult energies away from breeding activities. Such disturbances could jeopardize egg laying and rearing.

Double-crested cormorant. Work at piers E5 through E15 along the eastern span would potentially affect the double-crested cormorant colony nesting on the bridge. Nesting activities may occur any time within the breeding season between March and mid-September. Construction work during this time period could disrupt some or all of the nesting or attempted-nesting activities.

Winter-run, Spring-run, and Fall-run Chinook Salmon. Mobilization of sediments and increased turbidity could disrupt chinook salmon runs. Seismic retrofit of the East Span may involve dredging and removal of about 300,000 cubic meters (392,000 cubic yards) of material from the Bay. Adverse modification to chinook salmon critical habitat is not expected since the designated critical habitat is located to the north of the bridge.

Steelhead. Migration periods for both the Central Valley steelhead and Central Coast steelhead are similar to that of the chinook salmon. Potential impacts to steelhead are expected to be similar to those for chinook salmon.

Green Sturgeon. Sediment mobilization and turbidity from retrofit construction activities, such as dredging, may adversely affect this species. Although adult sturgeon may be present in the Bay all year, more sensitive periods occur when juveniles are present during the winter and spring months.

Longfin Smelt. This species is not generally present within this portion of the Bay due to the relative high saline conditions. It could be affected by retrofit construction if present during heavy rainfall and runoff years. Thus, during construction of the retrofit project, contaminants and sediments in the Bay waters could be mobilized and increase turbidity, which would affect the longfin smelt, if it is present.

Mitigation for Special Status Species

American Peregrine Falcon. In prior consultation concerning the East Span retrofit proposal, Caltrans and the USFWS have developed mitigation approaches to avoid impacts to this species. Mitigation is discussed in the 1997 Biological Opinion

and includes monitoring activities of the nesting pair on the East Span and releasing any chicks present to an off-site location.

Double-crested Cormorant. In prior consultation with USFWS, mitigation for impacts to this species would include excluding them from nesting along areas of the existing East Span. This mitigation is outlined in a 1997 Biological Opinion for the retrofit alternative. After construction activities are complete, double-crested cormorants would most likely recolonize the East Span bridge structure.

Chinook Salmon, Steelhead Trout, Green Sturgeon, Pacific Herring, and Longfin Smelt. There will be no direct impacts to special status fish species from the Retrofit Existing Structure Alternative. To minimize turbidity and sediment mobilization during dredging and construction of cofferdams, silt curtains would be installed around work areas.

Caltrans will require that periodic water quality inspections be conducted, particularly during dredging activities, to ensure that actions to minimize turbidity and sediment mobilization are in place.

Replacement Alternatives N-2, N-6, and S-4
Special Status Species.

American Peregrine Falcon. Noise generated by the construction of a replacement alignment alternative could affect breeding and nesting of this species. Mitigation measures would include the continuance of the monitoring and release efforts outlined in the contract between Caltrans and the Santa Cruz Predatory Bird Research Group, described above, for the interim seismic retrofit projects.

Double-crested Cormorant. During the construction of a replacement alternative, noise could affect the breeding and nesting of this species. Caltrans would monitor the double-crested cormorant colony during breeding season and prevent them from nesting on the existing bridge where potential impacts could occur by construction activities. The protocol to prevent double-crested cormorants from nesting would follow the methods implemented for maintenance activities on the existing bridge; this protocol involves washing partially constructed nests off the bridge with hoses. If the nests are completed and the birds have laid eggs, the nests cannot be disturbed.

Harbor Seal. Vibrations from blasting and pile driving activities may harass the harbor seals when resting at the haul-out site near the existing USCG station on the southwest side of YBI or foraging in the surrounding waters. Appropriate mitigation measures to avoid impacts to harbor seals are currently being developed in consultation with the National Marine Fisheries Service (NMFS). These will include a restriction on the use of explosives during the winter months when the harbor seals are using the haul-out site on YBI. The harbor seal haul-out site will be monitored periodically during construction activities to determine if seals are substantially disturbed even with these measures. If so, additional consultation with the NMFS will be initiated. During construction activities using explosives, a biological monitor will be present and conduct transects within a 1,000-yard safety zone from the proposed

blasting location. Blasting activities will only occur when the harbor seals are not present within the safety zone. If the construction time constraint cannot be applied and impacts cannot be avoided, an Incidental Harassment Authorization permit will be obtained from the NMFS as required by the Marine Mammal Protection Act under Section 10 (a)(5).

Winter-run, Fall-run, and Spring-run Chinook Salmon, Central California-Coast Steelhead, and Central California-Valley Steelhead (ESU's). Dredging activities associated with barge access would likely result in localized elevated suspended sediment concentrations with the potential for introduction of toxic contaminants in the water column. Mitigation measures to avoid and minimize impacts to fish and chinook salmon critical habitat would include measures such as the selection of certain dredge types (e.g., the cutterhead dredge, which may lower concentration of suspended materials) and the use of physical barriers such as silt curtains to contain the sediment plume and reduce suspended sediment concentrations in adjacent waters. If construction sequencing permits, dredging would be avoided in shallow water during the peak juvenile outmigration period (January 1 through May 31) in areas that are too large for a silt fence to be practicable,.

Construction activities, including blasting, could also adversely affect these fish species. To avoid impacts, blasting would occur, if construction sequencing permits, during the summer, from June 1 to October 1.

Green Sturgeon, and Longfin Smelt. Implementation of mitigation as described for the chinook salmon and steelhead would also reduce potential impacts to the green sturgeon and longfin smelt. To avoid impacts, blasting activities would occur during the summer, June 1 to October 1. Caltrans will consult with NMFS to determine protective measures if explosives must be used during this period.

Pacific Herring. An increase in sedimentation which could affect spawning of the pacific herring is and will continue to be monitored by the CDFG. Construction activities that occur during the seasonal herring spawning, generally December to March, will be monitored by a qualified biologist to watch for the presence of spawning herring. If the monitoring biologist (or CDFG) observes spawning in the project area, in-water construction activities, such as pile driving and dredging, will be suspended within 200 meters (656 feet) of observed spawn. In-water construction activities would not resume at that location for a period of up to 14 days (as determined by a qualified biologist), allowing herring eggs to hatch and larvae to disperse.

Blasting activities will be avoided during the spawning season, December to March. The use of explosives under water will require monitoring by a CDFG biologist during and after the explosion. The monitor will record the number and type of fish species affected by the explosion. Measures to minimize impacts associated with blasting will be developed with resource agencies and included in the conceptual mitigation plan to be discussed in the final EIS.

4.14.9 Construction Excavation and Dredging

Each of the build alternatives would require excavation on land an in-water dredging to retrofit existing or place new piers and to allow construction equipment access to construction sites. Disposal of materials could occur at upland disposal sites. Selected dredge materials would be disposed of at approved in-Bay disposal sites.

Anticipated construction scenarios and dredge quantities for the build alternatives are discussed in Section 2.6. Excavation requirements of the alternatives are presented below.

Retrofit Existing Structure Alternative

Bridge retrofit would include work on YBI, Oakland Touchdown, and in-Bay requiring excavation of materials. Upland work would consist of excavation to expand and encase existing columns and piers on YBI in concrete. Excavated materials on YBI will include soils and rock. These materials would be disposed of at an upland location yet to be determined.

In-Bay construction work for the Retrofit Existing Structure Alternative would require the construction of cofferdams at each existing pier. Sediments (comprising dredged material) would be pumped out of the cofferdams and the densest portion of this material, estimated to be approximately five percent, could be disposed of in-Bay and the remainder would be disposed of at an upland site (final percentages to be determined by DMMO). Estimated excavation quantities for the Retrofit Existing Structure Alternative are presented in Table 2.6-1.

Construction scenarios for the retrofit alternative would permit work in shallow water areas to take place from temporary construction trestles, shallow-draft barges, or conventional barges. Construction trestles would be constructed along both sides of the existing East Span from the Oakland Touchdown area eastward until water depths allow for standard barge access, a minimum draft of 3.66 meters (12 feet). Excavation volumes for placing trestle piles is shown in Table 2.6-1. The use of conventional barges would require dredging of the shallow water at the Oakland Touchdown area to 3.66 meters (12 feet). Dredging activity would occur along the western edge of the Oakland Touchdown area only and would not encroach into the mudflat areas on the northern shore. Shallow-draft barges could also require dredging for clearance, depending on the type of barge selected and the nature of the construction activity.

Replacement Alternatives N-2, N-6, and S-4

As described in Section 2.6, construction of the replacement alternatives would include work on YBI, Oakland Touchdown and in-Bay that would require excavation of materials. Upland work will consist of excavation to place footings for columns and piers on YBI and the Oakland Touchdown. Excavated materials on YBI would include soils and rock. These materials would be disposed of at an upland location yet to be determined.

Excavation at the Oakland Touchdown would be required to place piers to support the structures as they come to grade. Bridge roadways may need to be on pile-supported

fill to avoid settling on existing unstable fill. Soils excavated at the Touchdown would be disposed of at off-site locations. Some of the soils may contain hazardous materials and would require disposal at approved upland sites.

In-Bay construction activities would include dredging to allow construction barges to reach construction sites. Anticipated construction techniques for replacement alignment alternatives would require the use of large-scale construction equipment mounted on barges. Construction work for the replacement alignment alternatives is expected to be conducted from barges requiring a minimum draft of 3.66 meters (12 feet). Where water depths are less than minimum barge draft, access dredging would be necessary. Anticipated dredge volumes for construction barge access are presented in Table 2.6-1.

In-Bay work to dismantle the existing East Span would require excavation to remove existing bridge piers. Cofferdams would be constructed at each pier to remove pile caps, piers, and footings down to the existing mudline. Divers could also be used to place explosives or chemicals to break up pile caps, piers, and footings for removal. Different approaches to pier removal are under consideration. One approach would use standard draft barges similar to those proposed to construct replacement alternatives. This would require access dredging on one side of the existing East Span to allow barge access. Sections of the existing bridge would be lowered into barges for removal to onshore sites for further dismantling. Estimated excavation volumes for removal of the existing East Span are summarized in Table 2.6-1. Excavation volumes for materials potentially eligible for in-Bay disposal and upland materials are segregated in the table.

Mitigation. Disposal of excavated materials would require permits and approvals from federal, state and regional permitting agencies. Following identification of a preferred alternative, Caltrans would initiate consultation with agencies, including the ACOE, BCDC, RWQCB, USFWS, CDFG, and California EPA (DTSC), to gain permits and approvals to dispose of materials at specified in-Bay and upland sites.

Upland Disposal

Some soils excavated on YBI and at the Oakland Touchdown area are expected to contain hazardous materials that would require disposal at approved upland sites.

In-Bay Disposal

Bay muds excavated for access dredging under all build alternatives would be disposed of at an approved in-Bay disposal site, pending approval of permitting agencies. Consultation with the DMMO has been initiated to determine appropriate in-Bay disposal sites.

4.15 CUMULATIVE EFFECTS

4.15.1 Regulatory Setting and Methodology

Federal Council on Environmental Quality NEPA regulations require that the cumulative effects of a proposed project be addressed in an EIS (40 CFR §1508.25). Cumulative effects are effects on the environment that result from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions (40 CFR §1508.7). These effects can result from individually minor but collectively significant actions taking place over time. Frequently, mitigation of such effects must rely upon regulatory programs when they are attributable to actions outside of an agency's jurisdiction. For instance, while specific project effects on natural habitats may be mitigated by modification of a project's design, regulations of the California Department of Fish and Game, U.S. Army Corps of Engineers, and the National Marine Fisheries Service would address potential adverse habitat effects of development accommodated by the project. The specific development project proponent would be responsible for mitigation of these cumulative effects.

The analysis of cumulative effects in this EIS addresses cumulative impacts of the SFOBB East Span project in general with no separate analysis for each alternative.

This cumulative effects section identifies past, present, and reasonably anticipated future projects producing related or cumulative impacts, on resources (e.g., wetlands and cultural resources) and traffic-related impacts (e.g., noise and air quality) including other Caltrans projects and projects proposed by other agencies and developers outside the control of Caltrans. For this section, information sources examined for projects that may contribute to cumulative impacts include the BCDC Bay and Seaport Plans, the development plans of the Port of Oakland, the cities of Oakland, Emeryville, and the City and County of San Francisco. No specific shoreline projects other than the Port of Oakland projects are proposed at this time for the City of Oakland and no shoreline projects are currently proposed for the City of Emeryville. The analysis is presented by resource and includes a discussion of the expected cumulative environmental effects to be produced by the SFOBB East Span project in combination with other projects in the area.

For this EIS, cumulative impacts are considered to be those impacts resulting from the project, together with impacts from foreseeable development in the area proposed by the agencies and jurisdictions noted above. The impacts are considered to be cumulative when they contribute to effects on the same types of resources that are affected by the East Span project. The projects considered for cumulative effects for the East Span Project include the following:

City and County of San Francisco

- Proposed development on YBI could include single family residential development, live/work units, artesian cottages, and a visitor oriented facility (e.g. lodge). Development plans for TI could include residential, entertainment and publicly oriented recreation.

Port of Oakland

- Disposal and Re-Use of the Fleet and Industrial Supply Center, Oakland (FISCO), involving use of the 213 hectare (528 acre) site for the following uses: marine terminal (111 hectares [275 acres]); joint intermodal terminal (129 hectares [320 acres]); and habitat enhancement/public access (92 hectares [227 acres]). This project includes placement of 14 hectares (35 acres) of hard materials for development of marine terminals and 5 hectares (14 acres) for marine terminal berths. Construction is planned for late 1998 through three phases extending into year 2000. This project may be completed at about the time that construction commences on the East Span Project.

- Port of Oakland's Berth 21 project, filling 10.9 hectares (27 acres) in the Bay and involving development of a new marine berth within the Oakland Outer Harbor area. Construction is planned to be complete by year 2002.

- Port of Oakland Berth 22 extension, involving Bay fill of 1.5 hectares (26 acres).

- Port of Oakland 50-foot dredge project, where the inner and outer harbor channels would be deepened for larger capacity ships. Up to approximately 5.7 hectares (14 acres) of shallow tidewater habitat in the Outer Harbor shoal would be disturbed. Dredging operations would extend from late 1999 through the year 2003.

Seismic Safety Projects

- Central Freeway Seismic Safety Project (San Francisco County/Route 101)
- Bayshore Viaduct Retrofit (San Francisco County/Route 80)
- West Span Approach Ramps Seismic Retrofit
- SFOBB West Span Retrofit
- Oakland Distribution Structure (Alameda County/80/580/880)
- Richmond-San Rafael Bridge Seismic Retrofit
- Benicia Martinez Bridge Seismic Retrofit
- New Benicia Martinez Bridge (Capacity Project)
- Golden Gate Bridge Seismic Retrofit
- San Mateo/Hayward Bridge
- Carquinez Bridge Seismic Retrofit (East-Bound)
- West-Bound Carquinez Bridge

4.15.2 Local Context

Potential cumulative effects can either be regional in scale or of a local nature, where they may be considered less than significant at the project site, but could become significant when considered with other reasonably foreseeable future projects in the area. Reasonably foreseeable future projects are here defined as the projects listed above, which are closest to the East Span Project and have the potential to affect traffic and resources in the project area. Because the I-880/Cypress Freeway Replacement Project is nearing completion, and mitigation measures are fully developed, it is assumed to be complete for purposes of this section. Project-related land use, air quality, and noise effects reported earlier in this chapter would be the same as

cumulative conditions, because the analyses addressed planned future land use concepts on YBI and at the Oakland Touchdown area and future planned transportation facilities as evaluated by MTC for the RTP and TIP.

4.15.3 Evaluation of Cumulative Effects

Land Use

Historic land use patterns at and adjacent to the Oakland Touchdown area reflect progressively increased industrial use. The area was used as a terminus for ferry service prior to construction of the SFOBB and port facilities in the area continue to develop and expand.

On the YBI side of the project, land use patterns also show increased development of the island for military facilities which included extensive land form contouring and filling of bay waters where USCG facilities are located.

Project-Related Effects.

- Affect .2 hectare (0.5 acre) of land designated as "Resource Conservation Area" in the City of Oakland General Plan, located on the north shore of the Oakland Touchdown Area.
- In order to maintain full access to the USCG station on YBI during and after construction of the project, the station access road would be relocated which requires removal of USCG buildings.
- Redevelopment potential on east end of YBI would be affected due to presence of footings and columns.
- Port of Oakland expansion plans may be affected, depending on the alternative selected.

Cumulative Effects.

- No cumulative effects from the East Span project are anticipated.
- Redevelopment plans on YBI are not completely defined or developed at this time. Consequently, an assessment of potential cumulative land use effects would be speculative until the YBI land use plan is finalized and environmental documentation completed by the City and County of San Francisco and U.S. Navy.
- Provision of increased public access and open space opportunities at the Oakland Touchdown area, on combination with the increased amount of public access and open space opportunities proposed for the Port of Oakland projects, results in a cumulative environmental benefit.

Transportation

As a seismic retrofit project, none of the East Span build alternatives results in alteration of traffic levels of service or traffic patterns. Transportation effects of the project would occur during the short-term construction period. Cumulative effects are also limited to construction period traffic detours and lane closures of the other transportation projects listed above, in combination of the East Span Seismic Safety Project.

Project-Related Effects.

- Large vehicles could be restricted from using Macalla Road on YBI due to grade and turning radius restrictions.
- Possible closure of YBI ramps (EB right off-ramp and WB right on-ramp) for up to 18 months. (Note: access to YBI/TI will be maintained at all times during the construction period.)
- Temporary partial navigation channel closures. (Note: Access to the primary navigation channel under the SFOBB West Span will remain open.)
- Periodic land closures, lane reduction, and detours on Bridge, YBI and the Oakland Touchdown Area (scheduled during off-peak hours).

Cumulative Effects.

- Other seismic retrofit and bridge construction projects in the area may be under construction in the same time frame as the East Span Project. To the extent that construction periods overlap, there is a potential for cumulative local level traffic impacts from multiple project detours and lane reductions occurring simultaneously, potentially resulting in deterioration of traffic operations on area freeways. Caltrans will coordinate the timing of project detours and lane closures for all projects in the area in order to minimize cumulative traffic impacts. In addition, Caltrans plans a consolidated and large-scale public information program to inform motorists in advance of construction activities on these projects. Consequently, cumulative traffic effects of the East Span Project would be mitigated through planning and design and public awareness. Minimal regional congestion is likely to occur during the construction period resulting from seismic safety retrofit projects. Caltrans has successfully implemented similar programs for other construction projects in the Bay Area.
- Impacts to navigation from simultaneous bridge retrofit and new bridge construction projects would be minimized by coordinating work in the navigation channels of these projects so as not to adversely affect navigation. When the navigation channels at any of the Bay Area bridges are impacted, notification to mariners will be published as required by project specific USCG bridge permits.

Visual Quality

Project-Related Effects.

- Construction of the replacement span and detour structures would require removal of woodland vegetation from YBI, including oak woodland habitat near Macalla Road, and eucalyptus groves located at various points on the east side of YBI. A number of years would be required before the vegetation could reestablish itself to the density that exists today.
- Change in visual character of the dominant visual feature of the area (the existing bridge), resulting from construction of the replacement alternatives.
- Construction of replacement span detour structures will result in temporary visual impacts to those who live, work or visit YBI/TI from numerous temporary columns on YBI.

Cumulative Effects.

- Strengthening the existing SFOBB East Span or replacing it will present a change in the visual image of the bridge, but will not affect the overall scenic quality of the Bay Area.
- Other shoreline development which could occur under the plans reviewed for this analysis would change the views of the central Bay Shoreline and would intensify the urban character of the area.
- Future development on YBI, combined with the new bridge structures could result in alteration of the visual character of the island, especially if additional vegetation is removed to accommodate new development. Any new development on the island would be subject to environmental review where the visual impact of proposed development would be assessed and mitigation (e.g. replacement planting and landscape screening) would be required. In addition, when comparing the scale of the retrofitted or new bridge on YBI, to future development on the island, the cumulative visual effect of proposed changes to the island is small.
- Given the distance of the SFOBB East Span from other developable areas, the retrofitted or new bridge structure will not produce a cumulative visual impact with other shoreline development in the central Bay Area as the views are distinct and separated by the Bay itself.

Conclusion/Mitigation Measure. All vegetation removed as part of the project would be replanted with native and/or drought tolerant species. No additional mitigation for cumulative effects is necessary.

Air Quality

Current and projected traffic volumes of the existing SFOBB are included in the regional air quality analysis component of the Regional Transportation Plan (RTP) and Transportation Improvement Program (TIP). Since the East Span project does not increase capacity on the bridge, the SFOBB related input parameters to the regional analysis remain valid. The regional analysis estimates the cumulative emissions which would result from the Bay Area transportation system if the RTP and the TIP were implemented. This analysis indicated that estimated emissions were below the motor vehicle emissions budget identified in the SIP and therefore was found to be in conformance with the SIP.

Project-Related Effects.

- The project would not result in violation of state or federal standards for CO, ozone precursors, or PM10.
- The project would be in conformance with adopted Air Quality Plans and Rules adopted by the EPA, and MTC.

Cumulative Impacts.

- No cumulative air quality effects from the East Span project are anticipated.

Noise

The results of noise modeling indicate that overall noise levels decrease as a result of the replacement alternatives. Because the predicted noise levels exceed FHWA Noise

Abatement Criteria, in spite of the predicted reduction, noise attenuation must be considered in the environmental document.

Project-Related Effects.

- The project could result in noise levels approaching or exceeding the FHWA Noise Abatement Criteria at YBI.

Cumulative Effects.

- No cumulative noise effects from the East Span project are anticipated.
- As noted earlier, land use planning for YBI is ongoing and no final land use plan has been adopted at this time. Consequently, the noise generating characteristics of planned land uses on the Island are unknown at this time, and a cumulative noise evaluation is not possible. Therefore, the project would not contribute to cumulative noise impacts on YBI.

Hazardous Wastes

Hazardous waste issues are regulated under federal and state law which govern the investigation, classification, handling and disposal of such wastes. The potentially contaminated sites within the project area are located on YBI and the Oakland Touchdown area, both of which are isolated from other land areas.

A health and safety plan would be developed for the project to address hazardous waste to protect construction workers. As a result, the project would not contribute substantially to cumulative hazardous waste effects, and no additional cumulative effects would result from the project.

Project-Related Effects.

- The project could result in construction in areas contaminated with hazardous waste.

Cumulative Effects.

- On-going and planned construction projects discussed above have the potential to expose hazardous wastes during construction, and in some cases during project operation/implementation; however under the State and Federal hazardous waste regulations, no cumulative effects are anticipated.

Geology, Soils, and Seismicity

The project is located in a seismically active area subject to periodic earthquakes. The objective of the project is to provide a lifeline vehicular connection in the Transbay corridor in the event of a maximum credible earthquake. Once constructed, the project would benefit the other projects considered in this cumulative analysis, as well as the Bay Area as a whole, by maintaining a connection between the East and West Bay for emergency services, goods and employment.

Project-Related Effects.

- The completed project would result in reducing the risk of exposure of the traveling public to seismic conditions and hazards in the corridor.

Cumulative Effects.

- The Caltrans seismic retrofit and new bridge construction projects are each designed to reduce the risk of exposure to seismic hazards.

Conclusion/Mitigation Measures.

The East Span seismic safety project, in combination with other seismic retrofit and new bridge construction projects, would have the beneficial cumulative effect of reducing exposure of the traveling public to seismic risks, improving post-earthquake emergency response, and promoting post-earthquake economic recovery.

Water Quality

Water quality in the Bay is regulated by the San Francisco Regional Water Quality Control Board (RWQCB). The RWQCB has adopted water quality objectives to protect and enhance the beneficial uses of the Bay. In addition, the Bay Conservation and Development Commission (BCDC) regulates development in and along the Bay through their permitting process.

In accordance with the existing stormwater discharge permit, issued by the RWQCB to Caltrans District 4, Permanent Control Measures would be considered as part of the project design for the East Span project to control and minimize discharges of pollutants into the Bay. In addition, Caltrans would be required to develop a Stormwater Pollution Prevention Plan (SWPPP) to control potential sedimentation and pollution from water runoff during construction of the project. Both of these requirements would minimize water quality effects of the project and reduce the effects when viewed with other nearby projects.

Project-Related Effects.

- Potential impact due to incremental increase in impervious surface and stormwater runoff.
- Potential effects from erosion and potential groundwater contamination from excavation.
- Dredging operations in the Bay affect sedimentation and turbidity.

Cumulative Effects.

- Other Caltrans projects have potential water quality impacts due to the incremental increase in impervious surface area and potential effects from erosion. These projects are also subject to National Pollution Elimination System (NPDES) permit and SWPPP requirements which control the discharge of pollutants to surface waters, including the Bay. Projects under the control of other project proponents (e.g., the Port of Oakland) are also regulated by the RWQCB.
- Dredging operations from other projects in the Bay affect sedimentation and turbidity.

Conclusions/Mitigation Measures.

The East Span project and other projects under Caltrans jurisdiction include mitigation measures to reduce pollutants that would enter runoff. As a result, the project would not contribute substantially to cumulative water quality effects.

Dredging

Project-Related Effects.

- Construction of the East Span project would require dredging to retrofit existing or place new piers and to allow construction equipment access to construction sites. Selected dredged materials would be disposed of at approved in-Bay disposal sites.

Cumulative Effects.

- Caltrans is studying seismic retrofit and new bridge construction projects for the Benicia-Martinez, Carquinez, and Richmond-San Rafael, Hayward-San Mateo bridges as well as the SFOBB East and West Span projects; each is under various stages of construction, planning and design. Each of these projects and the East Span build alternatives would contribute to dredging and disposal of Bay sediment.

- Within the San Francisco Bay, the Port of Oakland's ongoing maintenance dredging projects and various Port expansion projects, in addition to the East and West Span projects would result in a cumulative increase in volumes of dredged material and disposal of Bay sediment.

Conclusion/Mitigation Measures.

Each of the dredging projects referenced above (including the Port of Oakland projects) are included in the U.S. Army Corps of Engineers' Long-Term Management Strategy (LTMS), which addresses dredged materials disposal in San Francisco Bay. The LTMS includes an estimated amount of construction access dredging for the Retrofit Existing Bridge Alternative. Aquatic disposal of dredged materials is closely regulated in terms of quantity, schedule, location, and hazardous material content. Based on the LTMS, no substantial cumulative impacts would result from implementation of East Span build alternatives.

Natural Resources

Impacts to wetlands and special aquatic sites, including mudflats and eelgrass beds are subject to U.S. Army Corps of Engineers (ACOE) jurisdiction under Section 404 of the Clean Water Act. In addition, special status species, including all plants and wildlife, are protected under the federal and state endangered species acts, the Migratory Bird Treaty Act, and the Marine Mammal Protection Act.

Project-Related Effects.

- The project will affect small amounts of wetlands, mudflats and eelgrass habitat on both YBI, and the Oakland Touchdown area.
- Construction of the project could result in temporary effects to harbor seals, chinook salmon, steelhead, green sturgeon, and longfin smelt.
- The project could also result in permanent impacts to marsh gumplant, double-crested cormorant, American peregrine falcon, western gulls and shorebirds.
- Alterations to Macalla Road on YBI could affect an area of coast live oak woodland.
- Project-related effects are addressed through mitigation measures under resource agency guidance and regulatory protection.

Cumulative Effects.

- The Port of Oakland projects would result in increased turbidity, potential suspension of pollutants from suspended dredge material released into the water, and removal of existing benthic communities in the areas dredged. Foraging areas for birds may be temporarily impacted from the increased turbidity and disturbance from dredging operations. Mitigation for these projects includes the removal of existing Bay fill to restore equivalent marine habitat.
- The majority of the Port of Oakland harbor impacts are related to berth construction and shipping channel dredging, which takes place in relatively deep water which is less productive than shallow water habitat. These areas are also not used extensively for fish spawning or nursery/rearing, and the benthic habitats are limited in diversity and abundance.
- The Port of Oakland projects do not have substantial impacts to shallow mudflat areas similar to the East Span Project. The potential for cumulative impacts of the East Span Project in combination with the Port of Oakland harbor projects is related primarily to the deeper water areas where dredging would be necessary, which are not as sensitive habitat. Impacts to the mudflat areas associated with the East Span Project can be mitigated, thus further reducing the potential for adverse cumulative effects.
- Construction activities associated with the retrofit of the Richmond-San Rafael Bridge could harass harbor seals adjacent to the project area.
- The bridge retrofit projects have the potential to adversely effect avian species such as the peregrine falcon and double crested cormorant, however the projects will implement similar mitigation measures under the jurisdiction of state and federal resource agencies as the East Span project, so the resulting effects are not considered significant. Therefore, since all of the projects will mitigate adverse effects, no cumulative effects on avian species are expected.
- Other bridge retrofit projects have localized effects on marine habitat primarily due to increased turbidity during construction.

Conclusion/Mitigation Measures.

The project includes measures to replace wetland and other habitat affected by the project. In addition, measures have been included to protect special-status animal species, under the review and approval of State and Federal regulatory agencies. As a result, the project would not result in a substantial cumulative effect on biological resources.

Cultural Resources

Section 106 of the National Historic Preservation Act requires agencies to take into account the effects of their projects on historic properties eligible or listed on the National Register of Historic Places.

Project-Related Effects.

- The retrofit and replacement alternatives would adversely affect or demolish the SFOBB East Span. There would be effects on other historic properties on YBI listed on or eligible for the National Register of Historic Places.

Cumulative Effects.

- Secondary impacts resulting from construction and development around the central Bay could affect preservation of historic properties and archaeological remains, including both those previously recorded and those which are yet to be discovered.
- Demolition of the historic Westbound Carquinez Bridge, a property determined eligible for the national Register of Historic Places.

Conclusion/Mitigation Measures.

The project includes mitigation measures to address the impacts of the East Span Project on historic properties. As a result, the project would not contribute substantially to a cumulative effect on cultural resources. Each of the projects listed in Section 4.15 would be subject to Section 106 compliance which requires consultation on project effects to historic properties and results in specific mitigation including preservation or documentation of affected historic resources and reducing the cumulative effect of the projects.

4.16 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The No-Build Alternative would not directly involve the use of resources. The East Span Project build alternatives would cost an estimated $909 million to $1.6 billion to construct, depending on the alternative, design variation, and temporary detour structure selected.

As described in Section 4.13, direct and indirect energy consumption would occur under all alternatives. Direct energy requirements for any of the alternatives would not increase from existing levels as a result of the project because the carrying capacity of the East Span would not be increased.

Construction-related energy use would total 3.5 million barrels of oil under the Retrofit Existing Structure Alternative and about 4.9 to 5.9 million barrels of oil under the replacement alternatives. No new construction is planned for the No-Build Alternative.

4.17 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

As described in Section 4.14, the East Span Project would result in temporary construction-related increases in noise, traffic congestion and delays, and air pollutants and would involve impacts to waters of the U.S. and special aquatic sites (mudflats). Impacts to waters of the U.S. and special aquatic sites could include placement of temporary Bay fill as construction trestles to retrofit or construct piers in shallow areas. The total amount of Bay fill would range from 14,900 cubic meters (526,200 cubic feet) to 54,100 cubic meters (1,910,500 cubic feet) under East Span Project build alternatives. In addition, the dismantling of the existing East Span represents the loss of an historic structure. The build alternatives may also affect land use patterns on YBI.

These and other short-term environmental impacts (i.e., "uses" of the environment) identified in Section 4.14 would be balanced by achievement of improved seismic and traffic safety and the related project needs identified in Chapter 1. Maintaining a "lifeline" connection for emergency response, commerce, and the movement of goods and people would enhance long-term productivity in the event of an MCE.

CHAPTER 5
CEQA STATUS AND FINDINGS

The SFOBB East Span Seismic Safety Project is exempt by statute from the requirements of the California Environmental Quality Act (CEQA) under California Streets and Highways Code (CSHC) Section 180.2 and CEQA Section 21080.

Sections 21000 through 21178.1 of the Public Resources Code make up the CEQA statutes. Section 21080 contains a list of projects that are generally identified as statutorily exempt; that is, they are granted exemption from CEQA by the state legislature. These are distinguished from other classes of projects listed in Section 21084 that may be found to be categorically exempt after some review.

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 Highways 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).

In the current project, the Retrofit Existing Structure Alternative meets the definition in Section 180.2 (a) and the replacement alternatives meet the definition in Section 180.2 (b). All project alternatives are considered "specific actions necessary to prevent or mitigate an emergency" and are, therefore, statutorily exempt from CEQA. Some exemptions are complete exemptions from CEQA and other exemptions apply to only part of CEQA requirements. The exemption of emergency actions is a complete exemption and does not require any environmental review under CEQA.

CHAPTER 6

SECTION 4(F) EVALUATION

6.1 INTRODUCTION

Section 4(f) of the Department of Transportation Act of 1966, codified in Federal law at 49 U.S.C. §303, declares that "[i]t is the policy of the United States Government that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites."

Section 4(f) 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 an 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."

Section 4(f) further requires consultation with the Department of the Interior and, as appropriate, the involved offices of the Departments of Agriculture and Housing and Urban Development in developing transportation projects and programs which use lands protected by Section 4(f).

In general, a Section 4(f) "use" occurs with a Department of Transportation-approved project or program when 1) Section 4(f) land is permanently incorporated into a transportation facility; 2) when there is a temporary occupancy of Section 4(f) land that is adverse in terms of the Section 4(f) preservationist purposes as determined by specified criteria (23 CFR §771.135[p][7]); and 3) when Section 4(f) land is not incorporated into the transportation project, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired (constructive use). 23 CFR §§771.135(p)(1) and (2).

Consultation with the Department of Agriculture (USDA) would occur whenever a project uses Section 4(f) land from the National Forest System. Consultation with the Department of Housing and Urban Development (HUD) would occur whenever a project uses Section 4(f) land for/on which certain HUD funding had been utilized. Since neither of these conditions applies to the proposed project, consultation with USDA and HUD is not required.

This draft Section 4(f) evaluation first discusses the San Francisco-Oakland Bay Bridge (SFOBB) and the Officers' Quarters Historic District, which are the only Section 4(f) - protected resources used by the proposed action. Following this there is a discussion of Section 4(f)-protected resources that are not used by the proposed action, as well as resources that were determined not to be Section 4(f) resources.

6.2 PROPOSED ACTION—PROJECT NEED AND DESCRIPTION

The proposed project would seismically retrofit the East Span of the San Francisco-Oakland Bay Bridge (SFOBB) by retrofitting the existing span or by replacing it with a new structure. The proposed project is limited to the East Span of the SFOBB, between Oakland and Yerba Buena Island (YBI); the West Span, between YBI and San Francisco, is already being retrofitted. The following discussion presents the need for the project and the project description.

6.2.1 Need for Project

The existing East Span must be replaced or retrofitted because it is not expected to withstand a Maximum Credible Earthquake (MCE) on the San Andreas or Hayward faults, it does not meet "lifeline" criteria for providing emergency relief access following an MCE, and it does not meet current operations and safety design standards.

The project is proposed to address 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 design standards for operations and safety.

Each of these needs is described in greater detail in Chapter 1 of this document.

6.2.2 Description of the East Span Seismic Safety Project

The proposed seismic safety project includes full consideration of five alternatives, briefly described below. The alternatives include a No-Build Alternative, a Retrofit Alternative, and three Replacement Alternatives. The descriptions also indicate whether each alternative could withstand an MCE and provide a lifeline connection. For a more detailed description of the alternatives, see Chapter 2 of this document. Lifeline connection is discussed in Chapter 1. (Figure 2-3 in Appendix A shows all the alignments for the build alternatives; the alignment for the Retrofit Alternative is the same as the alignment for the existing bridge.)

No-Build

This alternative would retain the existing SFOBB East Span. It is represented on various figures as the existing bridge alignment. The No-Build Alternative assumes some improvements to the East Span have been completed as a prior project. The Interim Retrofit Project is currently under way to strengthen bents and columns on the viaduct section on YBI and strengthen or toughen piers, bents, and trusses at selected locations on the structure, so that the existing East Span would be able to withstand a smaller but more likely earthquake. Under this alternative, the East Span would not withstand an MCE. As a result, this alternative would not provide a lifeline connection to carry emergency relief access after an MCE. The No-Build Alternative provides a baseline for comparison with the other alternatives.

Retrofit Existing Structure

Under the Retrofit Alternative the alignment of the bridge would not be modified and the bridge would remain a double-deck structure. Each deck section would also remain the same: five lanes, each about 3.5 meters (11.5 feet) wide, with no roadway shoulders. The alignment for this alternative is shown on various figures as the alignment for the existing bridge. (The alignment is shown in greater detail in Figures 2-4.1 through 2-4.4 in Appendix A.) This alternative would retrofit the existing SFOBB East Span to withstand an MCE; however, it would not provide a lifeline connection to carry emergency relief vehicles after an MCE. Although substantial modifications to the cantilever section are proposed as part of the Retrofit Alternative, it is nevertheless anticipated that the cantilever section would experience substantial damage and require extensive reconstruction or replacement following an MCE. If damage is such that reconstruction of the cantilever section is feasible, this may require complete closure of the East Span for six months to one year. If, however, damage is sufficiently severe that replacement becomes necessary, the East Span would be completely closed for a substantially longer period of time.

The retrofit strategy is based on strengthening and stiffening the substructure (below deck, piers, towers, and footings). Larger piles and pile caps would be built around most typical existing foundations. Typically, tower legs in the navigation channel would be encased in concrete. Two new piers (bridge support columns founded in water) would be added to support the cantilever main span just east of YBI. (See Figures 2-4.1 and 2-4.2 in Appendix A for locations of these new piers.) The superstructure would be modified to permit large displacements at specified joints. A new edge truss would be added to the cantilever section to restrict deformations. This trusswork would extend from the base of the lower deck to the bottom of the upper deck. The east viaduct and towers on YBI would also be retrofitted. (Figures 6-1 and 6-2 in Appendix A show the "before" and "after" simulation of the retrofitted bridge. The "after" simulation shows enlarged pile caps where the structure enters the water, tower legs encased in concrete, two new proposed piers under the cantilever section, and the new edge truss on the cantilever section.)

Alternative N-2

Alternative N-2 would construct a new bridge north of the existing East Span and dismantle the existing structure. The new structure could withstand an MCE and could

provide a lifeline connection. The new structure would also meet current roadway and design standards for operations and safety. The N-2 alignment parallels the existing bridge alignment as closely as possible, while maintaining clearance between the old and new structures to accommodate construction of the new bridge and dismantling the existing structure.

A new transition structure would separate the double-decked lanes exiting the YBI Tunnel into two parallel structures. The parallel structures would curve to the north, enter a tangent (straight) section over the navigation channel, parallel the existing alignment to the bend in the existing bridge at pier E-9, then turn gently away from the existing bridge and back south to the Oakland shore. (The alignment for this alternative is shown in greater detail in Figures 2-7.1a through 2-7.5 in Appendix A.) The parallel structures would reach the Oakland shore along the northern edge of the Oakland Touchdown and would conform to the existing traffic lanes to the west of the Toll Plaza.

Alternative N-6

Alternative N-6 would construct a new bridge north of the existing East Span and dismantle the existing structure. The new structure could withstand an MCE and could provide a lifeline connection. The new structure would also meet current roadway and design standards for operations and safety. The N-6 alignment arcs northward from the existing East Span to maximize panoramic views of the East Bay for eastbound bridge users and San Francisco skyline views for westbound bridge users. The northerly limit of this alignment has been set to minimize intrusion into portions of the Bay where geologic conditions increase the complexity and cost of constructing bridge piers.

A new transition structure would separate the double-decked lanes exiting the YBI Tunnel into two parallel structures. The parallel structures would curve to the north, enter a tangent (straight) section over the navigation channel, extend northward beyond the alignment for N-2, and turn back to the Oakland shore. (The alignment for this alternative is shown in greater detail in Figures 2-10.1a through 2-10.5b in Appendix A.) The parallel structures would reach the Oakland shore along the northern edge of the Oakland Touchdown and conform to the existing traffic lanes to the west of the Toll Plaza.

Alternative S-4

Alternative S-4 would construct a new bridge south of the existing East Span and dismantle the existing structure. The new structure could withstand an MCE and could provide a lifeline connection. The new structure would also meet current roadway and design standards for operations and safety. The S-4 alignment avoids use of developable land to the north of the existing East Span on YBI and also avoids conflicts with the alignment of the East Bay Municipal Utility District (EBMUD) sewer outfall that roughly parallels the existing East Span to the south.

A new transition structure would separate the double-decked lanes exiting the YBI Tunnel into two parallel structures. The parallel structures would curve to the south, enter a tangent (straight) section over the navigation channel, and then turn to the south and back to the Oakland shore, avoiding the EBMUD sewer outfall. (The

alignment for this alternative is shown in greater detail in Figures 2-11.1a through 2-11.5 in Appendix A.) The parallel structures would reach the Oakland shore to the south of the existing East Span and would conform to the existing traffic lanes to the west of the Toll Plaza. The alignment would cross the underground EBMUD sewer outfall on land after reaching the Oakland Touchdown area.

Temporary Construction Detour Options on Yerba Buena Island

For all replacement alternatives, temporary structures would be required on YBI. They would be in place for up to two years, including the time for their construction and removal. These temporary structures would reroute traffic around the existing bridge to allow construction and tie-in of a new permanent structure and dismantling of the existing structure while minimizing traffic impacts. Two temporary detour options are under consideration. These are referred to as the north option and the north-south option. The north option would construct both an eastbound and a westbound temporary structure to the north of the existing bridge; this option is available for Replacement Alignments N-2 and N-6. The north-south option would build a westbound temporary structure to the north and an eastbound temporary structure to the south of the existing bridge; this option is available for Replacement Alignments N-2, N-6 and S-4. (The foundations of the temporary detours are shown schematically in Figures 2-16.1 through 2-18 in Appendix A.) Two other options, constructing a double-deck temporary detour either to the north or south of the existing bridge, were considered and rejected; they are addressed in Chapter 2 of this document.

6.3 DESCRIPTION OF SECTION 4(f) RESOURCES USED BY THE PROJECT

Two Section 4(f) resources would be used by certain alternatives of the proposed project: the San Francisco-Oakland Bay Bridge (SFOBB) and its contributing components, and the Officers' Quarters Historic District on Yerba Buena Island. In the case of the SFOBB, the East Span and some of its contributing components would be used by the proposed project.

6.3.1 The San Francisco-Oakland Bay Bridge

The Entire San Francisco-Oakland Bay Bridge

The entire SFOBB, both East and West Spans, is 13.2 kilometers (8.2 miles) long from Fifth Street in downtown San Francisco to the SFOBB Toll Plaza in Oakland. It includes various bridge structures and ancillary buildings in San Francisco, on Yerba Buena Island (YBI) and at the Oakland Touchdown, and it includes a double-deck tunnel on Yerba Buena Island. (Figure 1-1 in Appendix A shows a schematic layout of the entire bridge.) The entire SFOBB is eligible for listing on the National Register of Historic Places, and as such, it is considered a historic property for the purposes of Section 4(f). It is a toll bridge owned and operated by Caltrans. It crosses San Francisco Bay and links the East Bay with the City and County of San Francisco and the San Francisco Peninsula. The double-deck roadway is a designated Interstate Freeway (Interstate 80) with five vehicle lanes on each deck which together carry 274,000 vehicles per day.

In 1931 the State of California established by law the California Toll Bridge Authority, with power to buy or build bridges and borrow money against their prospective tolls. The SFOBB was designed and constructed for the California Toll Bridge Authority by the San Francisco-Oakland Bay Bridge Division, California Department of Public Works. It opened to traffic in November of 1936 as a primary state highway, maintained by the Division of Highways (which later became Caltrans). The SFOBB is significant as a major work of civil engineering for its role in shaping Bay Area transportation patterns and for its association with the important engineers and architects who designed it.

The SFOBB was determined eligible for listing on the National Register of Historic Places in 1983. An evaluation was prepared by Caltrans as part of the Historic Property Survey Report (HPSR) for the I-280 Transfer Concept Program. The evaluation concluded that the SFOBB is eligible for listing on the National Register of Historic Places under Criteria A, B, and C at the national level of significance. The State Historic Preservation Officer (SHPO) reviewed this documentation and concurred with the determination that the SFOBB is eligible for inclusion on the National Register of Historic Places at the national level of significance under Criteria A, B, and C as defined by 36 CFR 60.4. Under these Criteria, the SFOBB:

A) Is associated with events that have made a significant contribution to the broad patterns of our history;

B) Is associated with the lives of persons significant in our past; and

C) It embodies the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

At the time the SFOBB was first opened for traffic in 1936, it broke many world records. It was the greatest bridge in the world for its cost, length, quantities of steel and concrete, weight, depth, and number of piers, the size of the bore of its tunnel on Yerba Buena Island, and the versatility of its engineering. Seven of its piers were deeper than any others in the world. New technologies were developed to construct the foundations. The submarine work was the greatest underwater engineering task ever undertaken. The steel for the superstructure was said to constitute the largest steel order ever placed.

The West Span and the East Span of the SFOBB are distinctly different bridge structures linked by the tunnel on YBI. The West Span consists of two double-deck suspension bridges joined to a common central anchorage in the Bay between San Francisco and Yerba Buena Island. The anchorages of one suspension bridge are in San Francisco and at the Center Anchorage (pier W-4), while the anchorages for the other suspension bridge are at the Center Anchorage (pier W-4) and on Yerba Buena Island. In contrast, the East Span consists of trusses, as discussed below.

The East Span of the SFOBB

The East Bay truss/cantilever span (East Span) of the SFOBB connects YBI to the Toll Plaza area on the Oakland shore (see Figure 1-1). The East Span and the contributing

components adjacent to it comprise a substantial part of the SFOBB historic resource. The East Span consists of a series of steel trusses with a cantilever truss system spanning the navigation channel near YBI. The east viaduct on YBI is a bridge structure that connects the East Span to the tunnel through the island. The east viaduct and the tunnel are contributing components to the historic resource.

The East Span is a complex structure consisting of many truss bridge components. The East Span consists of truss spans on YBI; one 427-meter (1,400-foot) cantilever span and two 156-meter (510-foot) anchor arms; five 155-meter (508-foot) through truss spans; 4,355-meter (14,288-foot) deck truss spans; and ten 25.2 meter (82.5-foot) girder spans.

A cantilever span is one in which its trusses are extended beyond their support. In other words, the span supports its weight by means of leverages operating over fulcrums. The cantilever section consists of three spans on four supports. The supports are piers E1, E2, E3, and E4. Piers E2 and E3 are the fulcrum piers. The three spans consist of two cantilever arms (E1-E2 and E3-E4), and one suspended span (E2-E3). The suspended span is supported at the outer ends of the cantilever arms. The anchor arms were built first, with huge guy derricks mounted on the bridge. Working from piers E1 and E4, the twin cantilever arms were constructed. Then, working from the fulcrum piers E2 and E3, the cantilever section was built in place, one member at a time.

Contributing Components Associated with the East Span

Four buildings associated with the East Span are contributing components of the SFOBB.

On YBI, just east of the tunnel, a small garage and electrical substation are immediately adjacent to the bridge on the north side. The buildings are utilitarian concrete structures. They were built in the late 1930s. (They are shown in relation to the replacement alternatives on Figures 6-4 through 6-6 in Appendix A).

At the Oakland Touchdown, there are two electrical substations adjacent to the eastern end of the bridge. They are eligible for the National Register as contributing components of the SFOBB. One of these, the Caltrans Substation, is a utilitarian concrete structure built in the late 1930s, similar to the substation on YBI. The other structure, the Key Pier Substation, was constructed in 1925-26 as part of the Key System Railway. It is a tall concrete building with a pyramidal roof and skylight. It is associated with the bridge as the substation providing power to the rail lines that were carried on the lower deck of the bridge until the rail lines were removed in the 1950s. It is also individually eligible for the National Register at the local level of significance under Criterion A as a rare surviving component of the historically significant Key System railway, which was an important East Bay transit system in the early 20th century.

6.3.2 The Officers' Quarters Historic District

The Officers' Quarters Historic District is eligible for the National Register under Criteria A and C. Criterion A is applied to historic properties associated with events that have

made a significant contribution to the broad patterns of our history. Criterion C applies to historic properties that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction. These criteria may be applied to historic districts as well as individual historic properties; in general terms, a historic district contains a number of historic buildings, structures or sites that are united historically, culturally or architecturally, and that as an assemblage meet the National Register criteria of significance.

Officers' Quarters Historic District is comprised of Naval Quarters 1 through 7 and three associated garages (Buildings 83, 205, and 230)(see Figures 6-4 through 6-6 in Appendix A). The district is eligible for the National Register under Criteria A and C, in the areas of military history and architecture. The seven residences are all of wood frame construction, with two full floors and dormered attic stories. They were constructed between 1900 and 1903 in the Classical Revival style. Quarters 1, the largest and most elaborate of these, was listed on the National Register of Historic Places in 1991. Buildings 83 and 230 are garages with second floor living quarters, constructed in 1918 and 1944, respectively. Building 205 is a single-story garage constructed in 1936. The district is significant for its association with the Naval Training Station on YBI and as a distinctive ensemble of Classical Revival residences. The boundaries of this roughly triangular historic district are the road to the west of Quarters 5 and 6, the lower edge of the lawn area to the east, and a line up the hill behind Quarters 1 that encompasses the formal gardens between Quarters 1 and Building 230. The boundaries include the historic buildings of the area and the contributing landscape elements. The current activities within the historic district do not include any activities directly associated with its history, such as docent-led historical tours, that would be impaired by proximity impacts of a transportation facility.

6.4 IMPACTS ON THE SECTION 4(f) PROPERTIES USED BY THE PROJECT

6.4.1 East Span of the SFOBB and its Contributing Components

Potential impacts of the project are discussed below as they relate to the Section 4(f) use of the East Span of the SFOBB and its contributing structures. The Retrofit Alternative and all of the Replacement Alternatives use this historic bridge. The No-Build Alternative would not use this 4(f) property nor any of its contributing elements, but it would not satisfy the project purpose and need.

Retrofit Existing Structure Alternative

This alternative would retrofit the existing East Span of the bridge, from Oakland to the east tunnel portal on Yerba Buena Island (YBI). The work would include the addition of new piles and pile caps at many piers, construction of two new piers at the main span of the cantilever truss and concrete encasement of several of the existing steel piers. A new edge truss would also be added to the cantilever section, from the base of the lower deck to the bottom of the upper deck. (Figures 6-1 and 6-2 in Appendix A show the "before" and "after" simulation of the retrofitted bridge. Figures 2-4.1 through 2-4.4

show the alignment of the existing bridge and the locations of new or expanded piers.) The Retrofit Existing Structure Alternative would result in a Section 4(f) use of this historic resource because it would alter elements of its design and materials, both of which contribute to the bridge's status as a National Register eligible property.

The Retrofit Existing Structure Alternative would not alter the garage and substation on YBI or the substations in Oakland that are contributing components of the bridge.

Replacement Alternatives N-2, N-6 and S-4

All of the replacement alternatives include dismantling of the existing East Span as well as removal of the two contributing buildings (the garage and electrical substation) on YBI. The replacement alternatives would not alter or demolish the Key Pier Substation or the other contributing substation at the Oakland Touchdown. Dismantling of the East Span and removal of two of its contributing buildings would result in a Section 4(f) use of the historic resource.

6.4.2 Officers' Quarters Historic District

Potential impacts of the project are discussed below as they relate to the Section 4(f) use of the Officers' Quarters Historic District. The Retrofit Alternative is the only project alternative that may result in a Section 4(f) use of this property; the Replacement Alternatives, none of which use the historic district, are discussed in section 6.7. The No-Build Alternative would not use this 4(f) property, but it would not satisfy the project purpose and need.

Retrofit Alternative

The Retrofit Alternative would enlarge existing pier YB2. (See Figure 2-4.1 in Appendix A.) The existing pier appears to be entirely outside the historic district and either adjacent to or near the historic district boundary.

The Officers' Quarters Historic District was identified in an historic architecture survey of Yerba Buena and Treasure Islands, carried out for the Navy in 1997. The district boundary in the vicinity of the SFOBB is not clear, due to discrepancies between the written description and the map that are included in the survey report. (The map from the survey report is shown on Figure 6-9 in Appendix A.) The map, which does not show scale, appears to show the drip line of the existing SFOBB as the southeast boundary of the district, while the written description does not mention the bridge or the landscape features (two triangular planter boxes and a concrete stairway) that are directly under or adjacent to the bridge. As part of its compliance with Section 106, FHWA intends to seek clarification of the district boundary in consultation with the SHPO and the Navy. FHWA will make a recommendation to the SHPO as to the most appropriate boundary for the historic district, as well as to its contributory and non-contributory elements, based on historical research and consideration of the integrity of the landscape features in the area beneath and adjacent to the bridge.

As a result of this lack of clarity regarding the district boundary and its contributing elements, it is not possible to determine with certainty that the widened pier of the Retrofit Alternative would be within the historic district. Based on currently available

information it has been determined that the widened pier from the Retrofit Alternative may be within the historic district; if so, this would constitute a 4(f) use. However, clarification of the historic district boundary may show that expanding pier YB2 would not incorporate land from the historic district, in which case this alternative would not result in a 4(f) use of the resource. Pending clarification of the historic district boundary, the widened pier is being considered a 4(f) use for the purpose of this Section 4(f) evaluation, since land from the historic district may be permanently incorporated into the transportation facility.

6.5 AVOIDANCE ALTERNATIVES

No-Build Alternative

The No-Build Alternative assumes that the Interim Retrofit Project, currently under way, is completed as a prior project. Once the Interim Retrofit Project is completed, the East Span would be able to withstand a moderate earthquake. Under the No-Build Alternative, the East Span would not withstand a Maximum Credible Earthquake (MCE), and it would not provide a lifeline connection.

The existing East Span has been extensively analyzed and evaluated to identify the seismically vulnerable bridge elements. A number of critical problems were revealed. The No-Build Alternative would put the traveling public and the operation of this important bridge at risk in the event of an MCE. Without a retrofit that goes far beyond what is provided by the Interim Retrofit Project, the ability of the East Span to continue to serve its purpose safely is jeopardized. Therefore, for reasons of public safety and retaining the operation of this important bridge, it has been determined that the No-Build Alternative is not feasible and prudent.

Build a New Bridge

This section considers potential alternatives that would construct a new bridge structure in an attempt to avoid a Section 4(f) use of the existing East Span of the SFOBB. However, none of the build alternatives avoid a Section 4(f) use of the existing East Span. These potential alternatives include: 1) build a new bridge that spans the entire Bay, either in a new corridor or next to the existing bridge; 2) build a new bridge around Yerba Buena Island and tie in to the existing West Span; 3) build a new bridge to Yerba Buena Island and tie in to the existing tunnel.

Build a new bridge that spans the entire Bay. A new bridge that spans the entire Bay could be built in a new corridor or in the same corridor as the SFOBB. If a new bridge were built in a new corridor, Caltrans could retain the existing bridge for transportation uses, and continue to own and maintain it. Under this scenario, the existing East Span would still be seismically vulnerable. The Interim Retrofit Project is currently under way on the existing East Span, to strengthen selected locations on the structure so that it would be able to withstand a smaller but more likely earthquake. Without a seismic retrofit project of much greater scope than the Interim Retrofit Project, such as what is proposed under the Retrofit Alternative for this project, portions of the East Span would collapse in an MCE. Any persons on the bridge in an MCE would be at risk, and any collapsed bridge sections in the Bay could create a navigational hazard. It is not prudent and feasible to leave the existing East Span in

place without a substantial seismic retrofit. Such a retrofit would result in a 4(f) use of the historic resource. This would not constitute an avoidance alternative.

The United States Coast Guard (USCG) has stated that, pursuant to the USCG Bridge Administration Manual, it would require that the existing East Span be removed if a new bridge were constructed. (See Appendix G for correspondence from the USCG.) Removal of the existing East Span would result in a 4(f) use of the historic resource.

There are additional issues raised by this avoidance alternative. A new bridge structure that spans the entire Bay would not use the existing Toll Plaza, West Span, and West Approach and would result in major infrastructure changes in both Oakland and San Francisco. Portions of downtown San Francisco would need to be substantially altered to construct a new west approach; in Oakland, a new touchdown and toll plaza would require substantial new right-of-way from the Port of Oakland or other shoreline landowners. Placement of a new bridge in a new corridor would substantially alter traffic patterns in the region and would transfer land use impacts of this scale to other Bay Area communities. The social and environmental impacts of a new bridge spanning the Bay would be considerable. Such a project would also likely generate substantial public controversy on environmental grounds. This avoidance alternative would require regional support as well as development of a new funding mechanism, since the funding for the East Span Project, State Senate Bill 60, does not provide for such a retrofit solution. The cost of this avoidance alternative would be substantially higher than costs of the project alternatives under consideration.

These factors in combination would lengthen the time required for planning, funding, approval and construction of a new bridge in a new location. The cost, social, economic, and environmental impacts and the community disruption that would result from implementing such an alternative would reach extraordinary magnitudes. Meanwhile, the existing bridge, and ultimately the travelling public and the economic welfare of the region, would be at risk from an MCE. The fundamental purpose of retrofitting or replacing the existing East Span, seismic safety, would not be served by this avoidance alternative. As such it is not a feasible and prudent alternative.

Build a new bridge around YBI. A second potential avoidance alternative would build a bridge structure from Oakland around Yerba Buena Island that would tie in to the existing West Span. It is not possible to undertake this without complete reconstruction of the West Span itself. The West Span consists of two suspension bridges joined at a common center anchorage in the Bay, and anchored at their outer ends on Yerba Buena Island and in San Francisco, respectively. Suspension bridges use a support system that consists of the anchorages, the draped cables and the vertical suspender rods that attach to the cables and the deck. It is not possible to join a new bridge system to the side of the West Span without affecting the cables and suspender rods, and to do so would jeopardize the entire bridge support system, necessitating a massive reconstruction effort. Further, any alternative that would reconstruct the West Span of the SFOBB would result in a Section 4(f) use of the historic property, and thus it would not constitute an avoidance alternative.

Build a new bridge to YBI and connect to the existing West Span by constructing a new tunnel on YBI. This potential alternative would build a new bridge to YBI on an alignment farther north or south of those considered for this project, but avoid the existing east tunnel portal by creating a new east tunnel portal and tunnel on YBI. The new tunnel would tie in to the existing tunnel so that traffic would continue to use the existing west tunnel portal and the West Span of the SFOBB. This would substantially alter the existing tunnel, which is a contributing component of the SFOBB. By doing so, this alternative would result in a 4(f) use of the historic structure, and thus it would not constitute an avoidance alternative. Construction of a new tunnel (and bridge structure) on YBI at about the same elevation of the existing tunnel would also result in 4(f) uses of additional historic properties to the north or south of the existing tunnel portal that would not occur as a result of the build alternatives of the East Span Project. The additional historic resources likely to be affected by this potential alternative include Quarters 8 and Quarters 10, on either side of the tunnel portal, as well as Quarters 1 and the Officers' Quarters Historic District.

As discussed previously, this alternative does not address the seismic vulnerability of the existing East Span, and the need for a substantial seismic retrofit to enable it to withstand an MCE. Again, a substantial retrofit would result in a 4(f) use of the historic resource. This does not constitute an avoidance alternative.

Rehabilitate the Existing East Span without Affecting Its Historic Integrity

As discussed previously, the existing East Span is vulnerable to earthquake forces generated by an MCE. A retrofit strategy that would rehabilitate the East Span to withstand an MCE would require substantial alterations to the existing bridge elements. These alterations, as discussed above under the Retrofit Existing Structure Alternative, would result in a 4(f) use. There is no way to avoid a 4(f) use of the SFOBB and still rehabilitate the East Span in a manner that would enable it to withstand substantial earthquake forces. This does not constitute an avoidance alternative.

Rehabilitate the Cantilever Truss of the East Span and Replace the Remaining Portions

It has been suggested that rehabilitating the cantilever truss of the East Span and constructing an improved viaduct leading up to it would be preservation-sensitive. The cantilever section was suggested for preservation efforts because particular engineering significance is attributed to this section of the East Span.

Retrofit of the cantilever truss would involve extensive work. This work was briefly cited in the description of the Retrofit Alternative, above. More specifically, calculations have indicated that major structural members of the cantilever truss would need to be replaced if they are not structurally isolated in terms of their response to earthquake forces. In order to avoid the tremendous traffic disruption and cost associated with major replacement tasks, external strengthening would be proposed to retrofit this section. This strengthening would be accomplished by constructing additional trusses to surround, stiffen, and confine the existing cantilever truss system. The existing tower legs would require substantial widening or the addition of supplemental tower legs to support the weight of this massive new truss. The pier foundations would need

substantial retrofitting to withstand the additional loads. Retrofit of the cantilever truss to withstand an MCE would result in substantial changes to that section of the East Span. This alternative does minimize harm to the bridge when compared to complete dismantling. However, this alternative would still substantially impair the value of the structure for its historic characteristics, and it would constitute a 4(f) use of the historic property. Accordingly, this does not constitute an avoidance alternative.

6.6 MEASURES TO MINIMIZE HARM

As discussed above, there is no build alternative, except the No-Build Alternative, that would avoid all 4(f) uses, because all of the build alternatives and potential avoidance alternatives would ultimately result in a 4(f) use of the historic bridge. Measures, however, can be taken to minimize harm to the SFOBB and to the Officers' Quarters Historic District.

6.6.1 East Span of the SFOBB and its Contributing Components

The San Francisco-Oakland Bay Bridge (SFOBB) is a historic structure eligible for inclusion on the National Register of Historic Places. Caltrans and the Federal Highway Administration (FHWA) have begun consultation with officials of the State Historic Preservation Office (SHPO) regarding project effects. Caltrans has also worked with the City of Oakland's Landmarks Preservation Advisory Board on measures to minimize harm.

No-Build Alternative

No action would be taken under the No-Build Alternative. There would be no impacts to Section 4(f) properties under this alternative. No measures to minimize harm are proposed for this alternative.

Retrofit and Replacement Alternatives

As discussed above, all the East Span Project alternatives except the No-Build Alternative will use the SFOBB, which is eligible for the National Register of Historic Places. Caltrans and FHWA have, however, worked with the SHPO and the City of Oakland's Landmarks Preservation Advisory Board (LPAB) on measures to minimize harm. Possible measures to minimize harm to the historic bridge as a result of the East Span Project are listed below. The list represents ideas being developed as possible mitigation.

- Recording the bridge to Historic American Engineering Record/Historic American Building Standards (HAER/HABS) will provide extensive graphic, photographic and text recordation of the entire bridge, including the East Span.

- A museum exhibit on "Bridging the Bay." The exhibit would provide interpretative materials on a number of topics related to the design, construction, and social and economic role of the SFOBB.

- A publication on the SFOBB using the HAER/HABS documentation.

- Rehabilitate the Key Pier Substation for use as an interpretive center commemorating the East Span and Key System, or other use (ongoing operations, staffing, funding, and maintenance would be provided by other parties).

- Rehabilitate the former toll plaza clock and install it in a public place.

- Provide historical markers about the East Span and the Key System at the Oakland Touchdown and, possibly, on Yerba Buena Island.

- Preserve a portion of the existing East Span at the Oakland Touchdown, should relocation efforts prove unsuccessful (ongoing maintenance would be provided by other parties).

- Commission a large-scale public artwork commemorating the bridge. The work would be placed on exhibit in a local institution.

- Produce a video exploring themes and topics that have not been heretofore widely researched regarding the SFOBB.

- Maximize public access to information regarding the SFOBB. This could include creation of an internet site. It could also include enabling motorists on or near the bridge to tune to a specific radio station and hear an interpretive message about the bridge transmitted via low-frequency, solar-powered transmitters.

- Develop a marketing plan to relocate the bridge. Due to its sheer size, multiple components, and double-deck configuration, it is not highly likely that marketing efforts to relocate the East Span will prove successful. Efforts will be made to salvage components of the structure for use at multiple locations as an alternative to relocation of the entire structure.

Marketing the bridge itself is one of the possible mitigation measures listed above, and it is often pursued when a historic bridge is replaced. It is not expected to be an effective preservation measure for the East Span of the SFOBB. Because of the sheer size of the bridge span (double deck, 3.9 kilometers [2.4 miles] long) and the multiple components that comprise it (cantilever truss and multiple other trusses of varying lengths), the East Span would be extremely difficult to transfer in its entirety to a single responsible party. It is only slightly more possible that the bridge could be broken into separate trusses for relocation to multiple locations with multiple owners. It is unlikely that a party could be found who would accept the bridge either in its entirety or in segments with preservation covenants and who would be willing to have the bridge or components open to the public. If moved to a seismically active region, it would still require retrofit, at great cost. Moving costs are also likely to be prohibitive.

6.6.2 Officers' Quarters Historic District

Pending clarification of the location of the historic district boundary, it appears that for the Retrofit Alternative, enlarging pier YB2 may incorporate some land from the historic district, thereby resulting in a 4(f) use. Measures to minimize harm from such a use would involve returning all disturbed areas to their existing or better condition, including

regrading excavated ground, replacing or restoring any impacted improvements, and replanting vegetation.

If YB2 were enlarged on three sides only, and not enlarged on the side nearest the historic district, this may avoid a possible 4(f) use of the historic district, and as such it would constitute a measure to minimize harm. This is not an ideal engineering solution. It would require more piles or tie-downs underground to balance the load carried on the pier foundation. It would be an "unbalanced" engineering design. Unbalanced engineering designs do not perform as well as balanced designs in a seismic event. Furthermore, tie-downs are not desirable structural elements for permanent structures, because not much is known about their long-term performance, and because any below-ground failures over time would be difficult to identify, inspect or repair. This measure to minimize harm is not prudent.

6.6.3 Memorandum of Agreement

Final mitigation measures will be developed through consultation with the State Office of Historic Preservation, the Advisory Council on Historic Preservation, the Navy, Caltrans and FHWA. These mitigation measures will be incorporated into a Memorandum of Agreement (MOA), to be developed after the identification of the preferred alternative. The MOA will be signed by the FHWA, the SHPO, and the Advisory Council on Historic Preservation (ACHP), as well as the U. S. Navy as an owner of historic properties on YBI, to stipulate measures to mitigate adverse effects to the SFOBB and other historic properties. Caltrans will participate as a concurring agency. MOAs are developed to describe the commitments to offset the adverse effects of a project on historic properties made by the project proponent and agreed to by the MOA signatories. Interested parties such as preservation groups, historical societies and Native Americans are invited to contribute to the process of developing these measures. A copy of the executed MOA will be included in the Final Environmental Impact Statement.

6.7 OTHER PARK, RECREATIONAL FACILITIES, WILDLIFE REFUGES, AND HISTORIC PROPERTIES EVALUATED RELATIVE TO THE REQUIREMENTS OF SECTION 4(f)

The purpose of this discussion is to address Section 4(f) requirements relative to other publicly owned park, recreational facilities and wildlife refuges, and other historic properties in the project vicinity. As discussed previously, the Retrofit Alternative may result in a 4(f) use of the Officers' Quarters Historic District; none of the other alternatives under consideration results in a Section 4(f) use of these other parks, recreational facilities or historic properties. There are no wildlife refuges in the vicinity. The discussion of each resource either documents:

- Why the resource is not protected by the provisions of Section 4(f) or
- If it is protected by Section 4(f), why none of the alternatives under consideration causes a Section 4(f) use by

- permanently incorporating land into the project,
- temporary occupancy of land that is adverse to the preservationist purposes of Section 4(f), or
- constructive use of land from the resource.

The following resources discussed below were identified in the project vicinity:

Parks and Recreation Areas

- Conceptual public access to the Bay at the Oakland Touchdown
- Envisioned park area near the Oakland Touchdown
- Envisioned segment of the Bay Trail on the San Francisco-Oakland Bay Bridge (SFOBB)

Historic Sites

- Officers' Quarters Historic District (for the Replacement Alternatives)
- Quarters 1 (part of the Officers' Quarters Historic District, and individually listed)
- Naval Quarters 8
- Naval Quarters 9
- Naval Quarters 10
- Building 262
- Key Pier Substation (contributor to the SFOBB and individually eligible)
- Prehistoric component of Archaeological Site CA-SFr-04/H
- Potential historic archaeological deposits

The following resources were found to be outside the project area and would not be affected by any of the project alternatives:

- Parcels along the east shore of the Bay in Emeryville, including the Emeryville Crescent area, currently being acquired from Catellus Corporation by the East Bay Regional Park District, for inclusion in the currently planned Eastshore State Park;
- A portion of the shoreline designated by the San Francisco Bay Conservation and Development Commission on their Bay Plan Map 4, Berkeley to Oakland, as the "Emeryville Crescent Wildlife area (proposed)," in the Emeryville Crescent;
- Depot Historic District, a historic district on United States Coast Guard property on Yerba Buena Island;
- Light Station Historic District, a historic district on United States Coast Guard property on Yerba Buena Island.

6.7.1 Conceptual and Envisioned Park and Recreational Facilities

Conceptual facilities are those for which funding has been allocated or for which preliminary approvals have been granted, but which await final design approvals. Conceptual park and recreation facilities near the project include public access to the Bay at the Oakland Touchdown.

Envisioned facilities are those that are under preliminary consideration by one or more agencies but for which funding has not been identified in any agency's capital improvement program. Park and recreation facilities envisioned near the project include an envisioned park at the Oakland Touchdown, and a segment of the Bay Trail

on the SFOBB that could be constructed as part of the East Span Project. (Although funding has been identified for a facility on the East Span that would become part of the Bay Trail, it would only be constructed as part of a Replacement Alternative. Until the project is approved, this segment of the Bay Trail is still an envisioned facility.)

Conceptual public access to the Bay at the Oakland Touchdown

As part of the Cypress Replacement Project (on I-880 in Oakland, Alameda County), Caltrans has made commitments to the San Francisco Bay Conservation and Development Commission (BCDC) to provide public access improvements to San Francisco Bay at the Oakland Touchdown. These include a bicycle path out to the west end of the Oakland Touchdown, where viewing areas would be developed, along with various public amenities, including a fish cleaning station and parking for approximately six vehicles. These public access improvements are described in concept in the permit granted by BCDC for the Cypress Replacement Project. The permit stipulates that these public access improvements are conditioned on the feasibility of construction; should construction prove infeasible, the permit provides that financial compensation would be accepted in lieu of constructing these improvements.

The public access improvements have not yet been constructed or developed beyond the original concept. The bicycle path out to the Oakland Touchdown is consistent with the San Francisco Bay Trail (discussed in greater detail below). Once implemented, the bicycle path would become part of the San Francisco Bay Trail. The route of the bicycle path out to the Oakland Touchdown is currently designated as "Bay Trail, proposed" by ABAG (see Figure 6-3 in Appendix A).

When replacement of the East Span became one of the retrofit strategies being considered for the East Span Project, concepts had not yet been developed for these public access improvements and both Caltrans and BCDC recognized the need for coordination between the two undertakings. Both agencies acknowledge the need for joint planning of the public access improvements and the East Span Project. Caltrans and BCDC are in the process of finalizing permit amendments to the existing BCDC permit for the I-880/Cypress Freeway to establish a schedule that would provide a joint planning process for these two projects and allow the public access improvement project to be implemented after the East Span Seismic Safety Project.

As outlined in 23 CFR §771.135(p)(5)(v), a Section 4(f) constructive use does not occur when a proposed transportation project and a Section 4(f) resource are concurrently planned or developed. An example of this is the planning or development of property by two or more governmental agencies, with jurisdiction for the potential transportation project and the Section 4(f) resource, in consultation with each other. Because of the joint planning activities which have occurred and will continue to occur between the two undertakings, a Section 4(f) constructive use will not result from the proximity impacts of the East Span Seismic Safety project on the future public access improvements. Therefore, there will not be an actual or constructive Section 4(f) use of this conceptual public recreational resource.

Envisioned Park Area near Oakland Touchdown

Various agencies have expressed an interest in development of a gateway park along the Bay shoreline at the Oakland Touchdown area of the SFOBB. A substantial portion

of the land in this area is currently part of the Oakland Army Base. This land, now owned by the U.S. Army, will ultimately be conveyed to a new owner or owners as the Oakland Army Base is closed. The disposition of this land must first be established before park funding and planning can be established and before an agency or agencies can commit to owning or operating it.

Interested Agencies. The Port of Oakland and the East Bay Regional Park District (EBRPD) are each seeking to acquire the Army's land at the Oakland Touchdown. In addition, following implementation of the East Span Project, if Caltrans determines that any of its right-of-way at the Oakland Touchdown is not needed for transportation purposes, it would automatically revert to the Port. The Port, EBRPD, and Caltrans all support the development of a park in the area of the Oakland Touchdown.

Other agencies interested in park planning, design, and operation include the City of Oakland, Port of Oakland, ABAG, and BCDC. Agencies participating in the Army's base closure decision-making process include the Oakland Base Reuse Authority, the West Oakland Community Advisory Group and the National Park Service.

Park Planning Process. Caltrans has initiated coordination meetings with the EBRPD and the Port of Oakland to discuss land use issues, the East Span Seismic Safety Project, and gateway park development possibilities. The City of Oakland, ABAG, BCDC, the Army and the National Park Service have also participated. Meetings were held on October 7, 1997; November 18, 1997; February 18, 1998; May 20, 1998; and July 22, 1998. Future meetings are planned. In these meetings, EBRPD and the Port have expressed a willingness to await the outcome of the environmental process for the East Span Project, and possible project construction, prior to making more definitive park plans. A Memorandum of Understanding is being developed to address various agencies' commitments to development of this park.

This envisioned park is in the very early planning stages. Much of the land involved is currently part of the Oakland Army Base. There is no identified lead agency or agencies for the development of a gateway park, nor is there funding for the planning, design, and construction of such a park. The park is not on any agency's plan. Therefore, the envisioned gateway park is not a Section 4(f) resource and is not protected by the provisions of Section 4(f).

Envisioned Transbay Segment of the Bay Trail

In 1989, the Association of Bay Area Governments (ABAG) prepared the Bay Trail Plan. This Plan established policies and proposed alignments for a bicycle and pedestrian trail system around the perimeter of San Francisco and San Pablo Bays. It provides a recommended route for a continuous trail and policies to guide the selection of alignments and trail design and implementation. ABAG provides planning input but does not fund Bay Trail segments. Individual projects to implement segments of the Bay Trail are funded by other agencies and organizations. Such projects are subject to independent environmental review as well as applicable permitting from BCDC or other agencies that may have jurisdiction. The Bay Trail Plan designated many existing trails as segments of the Bay Trail, and it proposed new trail segments that would make the Bay Trail continuous. It did not specify the exact locations, features, and connections

of envisioned new trail segments. Existing segments of the Bay Trail, as recreational trails on publicly owned land, are Section 4(f) resources.

ABAG's Bay Trail Plan proposed that segments of the Bay Trail cross San Francisco Bay via all transbay bridges, including the SFOBB. There is currently no Bay Trail crossing of the Bay via the SFOBB. East Span Project replacement alternatives each include a pedestrian/bicycle path. ABAG supports construction of such a path as part of this project. The transbay route of the bicycle path is currently designated as "Bay Trail, proposed" by ABAG (see Figure 6-3 in Appendix A).

On June 24, 1998, the Metropolitan Transportation Commission (MTC) voted to fund a pedestrian/bicycle path as part of a replacement structure. Therefore the locally preferred design variation for the replacement alternatives, as expressed by MTC, is to include a pedestrian/bicycle path. The No-Build and Retrofit Alternatives would not include a pedestrian/bicycle path; the replacement alternatives would include a pedestrian/bicycle path. If constructed, the path would ultimately be designated as part of the Bay Trail, linking to trail segments on the east shore of the Bay via the conceptual public access on the Oakland Touchdown described above. A path on the East Span would extend the Bay Trail from the east shore to Yerba Buena Island (YBI).

As the envisioned transbay segment of the San Francisco Bay Trail does not currently exist on the SFOBB, it is not a Section 4(f) resource and is not protected by the provisions of Section 4(f).

6.7.2 Historic Sites

In addition to the bridge and its contributing elements and the Officers' Quarters Historic District, there are six historic properties within the Area of Potential Effect as defined by the implementing regulations of the National Historic Preservation Act of 1966.

On Yerba Buena Island, these other historic properties include Naval Quarters 1, Naval Quarters 8, Naval Quarters 9, Naval Quarters 10, and Building 262. (They are shown in relation to each of the replacement alternatives on Figures 6-4 through 6-6 in Appendix A.)

At the Oakland Touchdown, the historic property is the Key Pier Substation. (It is shown in relation to each of the replacement alternatives on Figures 6-7 and 6-8 in Appendix A.) The Caltrans substation at the Oakland Touchdown (also shown on Figures 6-7 and 6-8) is a contributing component of the SFOBB and is not individually eligible; it was discussed above under 4(f) use of the East Span and its contributing components.

There is also one prehistoric archaeological site on YBI within the Area of Potential Effect, and there is the potential for historic archaeological resources. All of these resources are discussed below.

All of the historic properties within the Area of Potential Effect (Officers' Quarters Historic District, Quarters 1; Quarters 8, 9, and 10; and Building 262) are eligible for the

National Register under Criteria A and/or C. Criterion A applies to historic properties associated with events that have made a significant contribution to the broad patterns of our history. Criterion C applies to historic properties that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

This section first discusses each historic resource in relation to the permanent structures of the build alternatives. Following a discussion of the historic resources there is a separate discussion of the noise impacts of the permanent structures and the temporary impacts of the construction detours associated with the Replacement Alternatives.

Section 4(f) and Section 106

Section 4(f) applies only to programs and projects undertaken by the U.S. Department of Transportation and only to publicly-owned public parks, recreation areas, and wildlife refuges, and to historic sites on or eligible for the National Register of Historic Places. For protected historic sites, Section 4(f) is triggered by the "use" or occupancy of an historic site by a proposed project. There is also the situation, though rare, in which a project does not actually "take" or occupy an historic site, but because of its proximity impacts to the historic site, is determined by the Federal Highway Administration to substantially impair the qualities that made the historic site eligible for the National Register. This would be a "constructive use."

Section 106 is a different requirement which applies to any Federal agency and is concerned about the direct and indirect effects of an action on historic properties (see Section 4.10 of this Environmental Document for a definition of "effect" and "adverse effect"). Section 106 evaluates "effects" on an historic site, while Section 4(f) protects an historic site from "use" by a project. Therefore, even though there may be an "adverse effect" under Section 106 because of the effects upon the site, the provisions of Section 4(f) are not automatically triggered because the project would not result in an "actual use" or occupancy of land from the historical site. If there is not an "actual use," the analysis regarding whether Section 4(f) provisions are triggered needs to evaluate whether there is a "constructive use." A "constructive use" is determined by the Federal Highway Administration to occur "when the transportation project does not incorporate land from a Section 4(f) resource, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired. Substantial impairment occurs only when the protected activities, features, or attributes of the resource are substantially diminished." 23 CFR §771.135(p)(2).

Historic sites are listed on or eligible for the National Register for their architectural significance and/or their associations with broad historical patterns. The features and attributes that qualify them for the National Register are not typically affected by proximity impacts, because those features and attributes remain in place after project implementation. This is in contrast to publicly-owned parks, recreation areas, and wildlife refuges, which more typically have "activities" that could be substantially impaired by proximity impacts.

Officers' Quarters Historic District

The Officers' Quarters Historic District was described under section 6.4, above, since it may be used by the Retrofit Alternative. The district is discussed here in relation to the Replacement Alternatives. There is a lack of clarity regarding the historic district boundary and its contributing elements, as previously discussed. Pending clarification of the historic district boundary, Replacement Alternatives N-2 and N-6 are assumed to span a part of the historic district, as described below.

Replacement Alternative N-2. Alternative N-2 would be about 10 meters (33 feet) northwest of the existing bridge in the area of the historic district. Based on current information regarding the historic district boundary, a permanent structure for Alternative N-2 would extend over the southeast corner of the Officers' Quarters Historic District, where it would be a minimum of about 36 meters (120 feet) above lawn and shrubbery, supported by bridge piers outside of the historic district. This does not constitute a 4(f) use of the historic resource. An actual use would not occur because land from the historic district is not permanently incorporated into the new bridge facility. Future maintenance activities on the portion of the bridge spanning the historic district will be addressed in a new construction and maintenance agreement executed with the property owner (currently the Navy) for the portion of the bridge traversing YBI. The design of the permanent replacement structure (including the location of the bridge columns and footings outside of the historic district) and the required bridge maintenance activities to be addressed in the new construction and maintenance agreement will not result in a permanent loss of use of property within the historic district. Therefore, this is not a Section 4(f) use of the historic district by the permanent structures of Replacement Alternative N-2.

As stated in the Section 4(f) Introduction, constructive use would occur when a transportation project does not incorporate land from a Section 4(f) resource, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) would be substantially impaired. Substantial impairment occurs only when the protected activities, features, or attributes of the resource are substantially diminished. The permanent structure spanning a corner of the historic district does not substantially diminish the district's association with military history or the architecture of its historic buildings, the attributes which make it eligible for the National Register of Historic Places. Therefore, there is no 4(f) use of the property by the permanent structures of Replacement Alternative N-2.

Replacement Alternative N-6. Alternative N-6 would be about 12 meters (40 feet) northwest of the existing bridge in the area of the historic district. Based on current information regarding the historic district boundary, a permanent structure for Alternative N-6 would extend over the southeast corner of the Officers' Quarters Historic District, where it would be a minimum of about 36 meters (120 feet) above lawn and shrubbery, supported by bridge piers outside of the historic district. As in the discussion of Replacement Alternative N-2 above, the permanent structure spanning a corner of the historic district does not substantially diminish the district's association with military history or the architecture of its historic buildings, the attributes that make it eligible for the National Register of Historic Places. This does not constitute a

constructive use. An actual use would not occur because land from the historic district is not permanently incorporated into the new bridge facility. Future maintenance activities on the portion of the bridge spanning the historic district would be addressed in a new construction and maintenance agreement as described above for Alternative N-2. Therefore, the portion of the bridge that would span part of the historic district would not result in a Section 4(f) use of the historic district by the permanent structures of Replacement Alternative N-6.

Replacement Alternative S-4. Alternative S-4 would shift the new bridge slightly farther away from the historic district than the existing bridge. This alternative would not result in any Section 4(f) use of the historic district as a result of the permanent structures.

Quarters 1

Quarters 1 is listed on the National Register under Criteria A and C as an individual property, and as a contributor to the Officers' Quarters Historic District. It is of wood frame construction, with two full floors and dormered attic stories. It was constructed in 1899-1900 in the Classical Revival style. The largest and most elaborate of the buildings in the historic district, Quarters 1 was individually listed on the National Register of Historic Places in 1991.

The property associated with Quarters 1 is bounded by the drive in front of the house (Whiting Way), the near edge of the lawn area below Quarters 1, brick retaining walls at the edge of the paved area behind the house, and the driveway between Quarters 1 and Quarters 2.

Retrofit Existing Structure Alternative. The Retrofit Existing Structure Alternative would encase piers YB2 through YB4 on YBI. The encasement of these piers would present a large concrete wall at YB3. This wall would obstruct the view from Quarters 1 across the eastern portion of San Francisco Bay. The retrofit alternative would not require the use of any land within the historic property boundaries.

Constructive use occurs when a transportation project does not incorporate land from a Section 4(f) resource, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired. Substantial impairment occurs only when the protected activities, features, or attributes of the resource are substantially diminished. A constructive use has been found to occur when the proximity of the proposed project substantially impairs esthetic features or attributes of a resource protected by Section 4(f), where such features or attributes are considered important contributing elements to the values of the resource. An example of this would be when a proposed transportation facility is located in such proximity that it obstructs or eliminates the primary views of an architecturally significant historical building. However, there already is a transportation facility near Quarters 1. The existing East Span of the SFOBB already obstructs primary views from Quarters 1, and it had been obstructing these views for over fifty years when Quarters 1 was listed on the National Register in 1991. Therefore, the impairment of the view from Quarters 1 by the Retrofit Alternative does not constitute a constructive use. Under Section 4(f) criteria, the Retrofit

Alternative would not result in proximity impacts that would substantially impair the association of Quarters 1 with military history or its architecture, which are the attributes that qualify it for protection under Section 4(f). The historic property does not derive a substantial part of its value from its setting, and the change in the setting resulting from the Retrofit Alternative would not alter its qualifications for listing. The retrofit alternative does not result in a 4(f) use of Quarters 1.

Replacement Alternatives. Alternative N-2 would slightly alter the view from Quarters 1, with concrete columns replacing the steel columns of the existing bridge. The column locations would not substantially diminish the views from Quarters 1.

Alternative N-6 would slightly alter the view from Quarters 1, with concrete columns replacing the steel columns of the existing bridge. The column locations would not substantially diminish the views from Quarters 1.

Alternative S-4 would shift the new bridge slightly farther away from Quarters 1 than the existing bridge.

Under Section 4(f) criteria, the replacement alternatives would not result in 4(f) use or proximity impacts that would substantially impair Quarters 1's association with military history or its architecture, which are the attributes that qualify it for protection under Section 4(f).

Naval Quarters 8

Naval Quarters 8 is a three-story residence of Mediterranean design, built of wood with a stucco exterior on the first two floors. (See Figures 6-4 through 6-6 in Appendix A.) It was constructed in 1905 as the home of the commander of the Marine Corps detachment assigned to YBI. The property is eligible for the National Register at the local level of significance under Criteria A and C, in the areas of military history and architecture. The house is historically significant as one of the few extant buildings from the early 20th century associated with the Naval Station on YBI and the last remaining building associated with the Marine Corps presence on the island. It is also architecturally significant as the work of the prominent San Francisco architects James and Merritt Reid.

Retrofit Existing Structure Alternative. The retrofit alternative would avoid Quarters 8. The attributes that make the building eligible for the National Register would not be changed. Under Section 4(f) criteria, the retrofit alternative would not result in proximity impacts that would substantially impair the attributes that qualify the historic property for protection under Section 4(f). Under this alternative there would be no 4(f) use of this historic property.

Replacement Alternatives. The replacement alternatives would avoid Quarters 8. The architectural and historic significance of Quarters 8 will remain during and after construction of any of the replacement alternatives. Under Section 4(f) criteria, the replacement alternatives would not result in proximity impacts that would substantially impair the attributes that qualify Quarters 8 for protection under Section 4(f). There would be no 4(f) use of this historic property by any of the replacement alternatives.

Naval Quarters 9

Naval Quarters 9 is a 1-1/2-story residence of wood-frame construction. (See Figures 6-4 through 6-6 in Appendix A.) The property is eligible for the National Register at the local level of significance under Criteria A and C, in the areas of military history and architecture. It was built ca. 1916 as the residence for the civilian "master of tugs" and is the only extant building on YBI constructed for a civilian employee of the Navy. It is also one of the few surviving buildings on the island from the period of extensive growth of the Naval Station in the years before and during U.S. involvement in World War I.

Retrofit Existing Structure Alternative. The Retrofit Alternative would avoid Quarters 9. Under Section 4(f) criteria, the retrofit alternative would not result in proximity impacts that would substantially impair the attributes that qualify Quarters 9 for protection under Section 4(f). There is no 4(f) use of this historic property.

Replacement Alternatives. The Replacement Alternatives would avoid Quarters 9. The architectural and historic significance of Quarters 9 will remain during and after construction of any of the replacement alternatives. Under Section 4(f) criteria, the replacement alternatives would not result in proximity impacts that would substantially impair the attributes that qualify Quarters 9 for protection under Section 4(f). There would be no 4(f) use of this historic property by any of the Replacement Alternatives.

Naval Quarters 10

Naval Quarters 10 is a two-story wood-frame residence constructed in 1948. (See Figures 6-4 through 6-6 in Appendix A.) The property is eligible for the National Register at the local level of significance under Criterion C, for its architecture. It is architecturally significant as a distinctive example of Bay Area modernism. The historic property includes the house and its immediate grounds, including adjacent lawn and garden areas, the garage (Building 267) and driveway, and the retaining wall along the north side of the property. Quarters 10 is next to Macalla Road, which is not historic.

Retrofit Existing Structure Alternative. The retrofit alternative would not result in a 4(f) use of this historic property.

Replacement Alternatives. The permanent structures for the Replacement Alternatives would avoid Quarters 10. The architectural and historic significance of Quarters 10 will remain during and after construction of any of the replacement alternatives. Under Section 4(f) criteria, the replacement alternatives would not result in proximity impacts that would substantially impair the attributes that qualify Quarters 10 for protection under Section 4(f).

Building 262

Building 262, at the eastern tip of YBI, is a reinforced concrete building with a corrugated gable roof. (See Figures 6-4 through 6-6 in Appendix A.) The property is eligible for the National Register at the state level of significance under Criteria A and C, in the areas of military history and architecture. It was constructed for the U. S. Army in 1891, for the manufacture and storage of mines to be used in coastal defense. The building is historically significant as the only extant building associated with the

19th century Army presence on YBI. It is also significant architecturally, as a pioneering example of reinforced concrete construction, a building technique that was still in its infancy in 1891.

Retrofit Existing Structure Alternative. The Retrofit Alternative would modify the existing bridge. The existing bridge passes approximately 28 meters (90 feet) to the southeast of Building 262, and is about 53 meters (175 feet) above the ground in this area. Under Section 4(f) criteria, the retrofit alternative would not result in proximity impacts that would substantially impair the attributes that qualify Building 262 for protection under Section 4(f). This alternative would not result in a 4(f) use of this historic property.

Replacement Alternatives. The existing bridge passes approximately 28 meters (90 feet) to the southeast of this building, and is about 53 meters (175 feet) above the ground in this area. The new bridge for Alternative N-2 would pass directly over Building 262 at approximately the same height as the existing bridge. The two side-by-side decks would cover the entire length of the building. The close proximity of the new structures and the permanent shadow they would cast would not substantially impair the building's association with military history or its architecture, the attributes that qualify it for protection under Section 4(f). This alternative would not result in a 4(f) use of Building 262.

Alternative N-6, like Alternative N-2, would construct replacement structures directly over the building at approximately the same height as the existing bridge. As with Alternative N-2, the proximity impact of Alternative N-6 would not substantially impair the building's association with military history or its architecture, the attributes that qualify it for protection under Section 4(f). This alternative would not result in a 4(f) use of Building 262.

Alternative S-4 would pass to the southeast of Building 262 rather than directly above it, and would be farther away than the existing bridge. This alternative would not result in a 4(f) use of Building 262.

None of the build alternatives (retrofit and replacement alternatives) require the use of Building 262. The building's association with military history and its architecture will remain during and after construction of any of the replacement alternatives. Under Section 4(f) criteria, these alternatives would not result in proximity impacts that would substantially impair the attributes that qualify Building 262 for protection under Section 4(f). There is no 4(f) use of this historic property, nor do any of the alternatives incorporate land from the substation into the transportation facility.

Key Pier Substation

The Key Pier Substation is historically significant at the local level, is also a contributor to the Bay Bridge, and is individually eligible as one of the few surviving buildings associated with the Key System. (See Figures 6-7 and 6-8 in Appendix A.) None of the alternatives would result in actual use or proximity impacts that would substantially impair the attributes that qualify the substation for protection under Section 4(f). There is no 4(f) use of this historic property.

Archaeological site

Section 4(f) applies to archaeological sites on or eligible for inclusion in the National Register of Historic Places. It does not apply where FHWA, after consultation with the SHPO and the ACHP, determines that the archeological resource is important chiefly because of what can be learned by data recovery and that it has minimal value for preservation in place (23 CFR §771.135(g)(2)). The archaeological site on YBI, CA-SFr-04/H, is potentially eligible for the National Register listing under Criterion D; and since this site has yielded and may again yield human remains, its potential significance may extend beyond Criterion D. It is important chiefly for the information it contains. It does not warrant preservation in place. Accordingly, Section 4(f) does not apply to this archaeological site.

Archival research has indicated that there is a potential for eligible historical archaeological resources on Yerba Buena Island which are related to the American Period and associated with the presence of the Army Post and Depot and civilian occupation. Further archaeological research is being undertaken to gather additional information related to the possible preservation of American Period resources, both on land and on the Bay bottom. Given the nature of the potential resources that may be present, they would be important chiefly for what could be learned through data recovery and would have minimal value for preservation in place. Section 4(f) would not apply to these possible resources.

Noise levels

The Replacement Alternatives would not result in noise increases at or near historic properties. The expected noise levels after completion of a replacement structure would be 6 to 10 dBA lower than existing noise levels. The reasons for this noise reduction are discussed in Chapter 4, Section 5. All of the historic properties were listed or found eligible for the National Register of Historic Places with the existing bridge in place; the existing noise from the bridge did not affect their eligibility. Constructive use occurs when the projected noise level increase attributable to the project substantially interferes with the use and enjoyment of a noise-sensitive facility of a resource protected by Section 4(f). Because noise levels would be reduced with the Replacement Alternatives, there is no constructive use of these historic resources as a result of noise levels.

Temporary detours

For all replacement alternatives, temporary detour structures would be required on YBI. They would be in place for up to two years, including the time for their construction and removal. These temporary structures would reroute traffic around the existing bridge to allow construction and tie-in of a new permanent structure and dismantling of the existing structure while minimizing traffic impacts. The affected areas would be restored to their prior condition at the completion of the project, including replacement planting of lawn, shrubs and trees, and restoring the ground to its original condition. Two temporary detour options are under consideration. These are referred to as the north option and the north-south option. The north option would construct both an eastbound and a westbound temporary structure to the north of the existing bridge; this option is available for Replacement Alignments N-2 and N-6. The north-south option

would build a westbound temporary structure to the north and an eastbound temporary structure to the south of the existing bridge; this option is available for Replacement Alignments N-2, N-6 and S-4. (The foundations of the temporary detours are shown schematically in Figures 2-16.1 through 2-18 in Appendix A.) Two other options, constructing a temporary double-deck detour either to the north or south of the existing bridge, were considered and rejected; they are addressed in Chapter 2 of this document. All of the temporary detour options would avoid Quarters 8, Quarters 9, and Building 262. The other historic properties are discussed in greater detail below.

As outlined in 23 CFR §771.135(p)(7), when the following conditions are satisfied a temporary occupancy of land is so minimal that it does not constitute a 4(f) use within the meaning of Section 4(f):

(1) Duration must be temporary, i.e., less than the time needed for construction of the project, and there should be no change in ownership of the land;

(2) Scope of the work must be minor, i.e., both the nature and the magnitude of the changes to the Section 4(f) resource are minimal;

(3) There are no anticipated permanent adverse physical impacts, nor will there be interference with the activities or purposes of the resource, on either a temporary or permanent basis;

(4) The land being used must be fully restored, i.e., the resource must be returned to a condition which is at least as good as that which existed prior to the project; and

(5) There must be documented agreement of the appropriate Federal, State, or local officials having jurisdiction over the resource regarding the above conditions.

Temporary detours for Replacement Alternatives N-2 and N-6. These temporary detour options would involve one or both temporary structures passing over a portion of the Officers' Quarters Historic District and would require the construction of approximately four to fourteen column footings within the historic district.

The north detour option would have temporary structures passing over Quarters 1. As shown in Figures 2-16.1 and 2-17.1, portions of some column footings would extend into retaining walls at the boundary of the Quarters 1 historic property. These figures are schematic; the locations will be refined during final design to avoid incorporating land from Quarters 1 for these columns. The temporary detours would not restrict access to the historic district or Quarters 1.

The north detour options would require the construction of temporary column footings on the property of Quarters 10 (see Figure 2-16.1 and 2-17.1 in Appendix A). These figures are schematic; the locations would be refined during final design to avoid the garage. In front of the property, the grade of Macalla Road (which is not historic and does not contribute to Quarters 10) would be lowered to pass under the temporary detour structure. This would temporarily eliminate vehicle access to Quarters 10. (See Section 4.14.2 for further discussion of this impact.) Building 262, which is a contributing component of the property, would be monitored during roadway work to

ensure protection of its foundation. As part of the project, ground disturbed by the construction of column footings would be restored, replacement planting would be done, Macalla Road would be restored to its original profile and access to the property would be restored.

Temporary detours for Replacement Alternative S-4. The temporary detour option for Replacement Alternative S-4 would involve a temporary structure passing over the Officers' Quarters Historic District to the south of Quarters 1 and would require the construction of approximately six column footings within the district, in lawn and paved walkway areas. The temporary detour would not restrict access to the historic district or Quarters 1.

Analysis of potential Section 4(f) use. Pursuant to 23 CFR §771.135(p)(7), the temporary detours for any of the Replacement Alternatives would be in place for up to two years; this is less than the time needed for construction of the project, which will be approximately five years. The scope of work involves the placement of columns and footings in landscaped or paved areas of two historic resources: the Officers' Quarters Historic District (for all temporary detours); and Quarters 10 (for the N-2 and N-6 north detour options only). The columns would support one to two five-lane wide temporary structures overhead.

This would involve some excavation within landscape areas and a temporary change in the viewsheds of these two historic resources. The excavation and temporary viewshed changes are minimal changes to these historic resources. The architecture of these two resources and their association with military history, the attributes that qualify them for the National Register, would still be in place. There are no anticipated permanent adverse physical impacts from the placement of these temporary structures within the grounds of these historic resources. The land temporarily occupied by these columns and footings would be fully restored as part of the project, including replacement planting and restoring ground to its original condition.

The temporary detours required for the Replacement Alternatives meet the first four conditions outlined in 23 CFR §771.135(p)(7) for minimal occupancy of land. Caltrans and the Federal Highway Administration are consulting with the SHPO, the official having jurisdiction over historic resources pursuant to Section 4(f), to seek their agreement with these four conditions pursuant to 23 CFR §771.135(p)(7)(v). If the SHPO agrees regarding these conditions, this will be documented in the Final Section 4(f) Evaluation accompanying the Final Environmental Impact Statement for this project. If the SHPO were to not agree regarding these conditions, a separate Supplemental Draft 4(f) Evaluation would be prepared to address the Section 4(f) use of historic properties by the temporary structures. To receive a copy in the event that a Supplemental Draft 4(f) Evaluation would be prepared, contact Mara Melandry, Caltrans, P.O. Box 23660, Oakland, CA 94623-0660; or John Schultz, Federal Highway Administration, 980 9th Street, Suite 400, Sacramento, CA 95814-2724. It is assumed for this 4(f) evaluation that SHPO will agree, and that the temporary detours for the Replacement Alternatives are found to have such a minimal occupancy of land that they do not constitute a 4(f) use within the meaning of Section 4(f).

6.8 COORDINATION

Compliance with Section 106 of the National Historic Preservation Act and its implementing regulations is being achieved through coordination among Caltrans, the Federal Highway Administration (FHWA), the State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation (ACHP). FHWA, SHPO, ACHP, and the U.S. Navy will execute a Memorandum of Agreement (MOA) which will describe mitigation measures for the East Span of the SFOBB and its contributing buildings and the Officers' Quarters Historic District.

6.8.1 Local and Regional Preservation Community

In April of 1997, letters were sent to the following organizations, inviting their comments on this undertaking:

- American Society of Civil Engineers, History & Heritage Committee
- Berkeley Architectural Heritage Association
- California Preservation Foundation
- Foundation for San Francisco's Architectural Heritage
- National Trust for Historic Preservation, Western Regional Office
- Oakland Heritage Alliance
- Oakland Landmarks Preservation Advisory Board (LPAB)
- San Francisco Landmarks Preservation Advisory Board (LPAB)

In addition, representatives of Caltrans attended a meeting of the Oakland LPAB in July of 1997 and gave a brief presentation on the undertaking. This meeting was also attended by representatives from the Oakland Heritage Alliance, the California Preservation Foundation, and staff to the San Francisco LPAB. The Oakland LPAB responded by letter on January 14, 1998, advocating that consideration be given to retrofit of the existing bridge rather than replacement and suggesting several mitigation measures if a replacement alternative is selected and the existing East Span is dismantled. Caltrans continues to coordinate with the Oakland LPAB regarding potential mitigation measures and other historic preservation issues associated with the East Span Project.

Staff and members of the Oakland LPAB and the City and County of San Francisco (CCSF) have also attended and offered public comment at meetings of the Metropolitan Transportation Commission (MTC) and MTC's Engineering and Design Advisory Panel regarding this project. They have also attended park planning meetings, special focused meetings, and project development team meetings.

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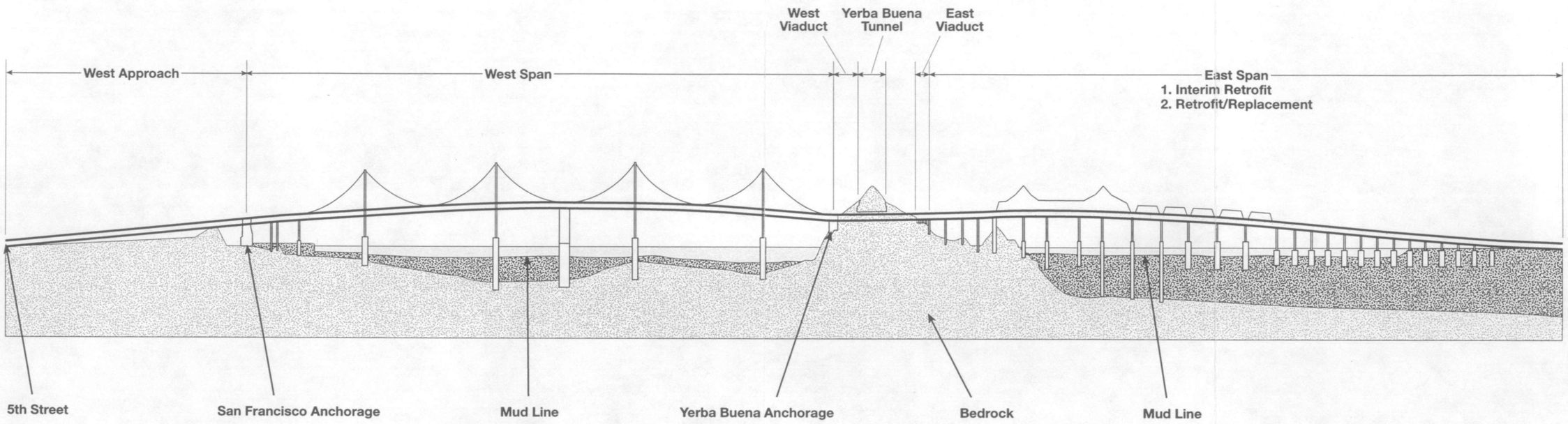
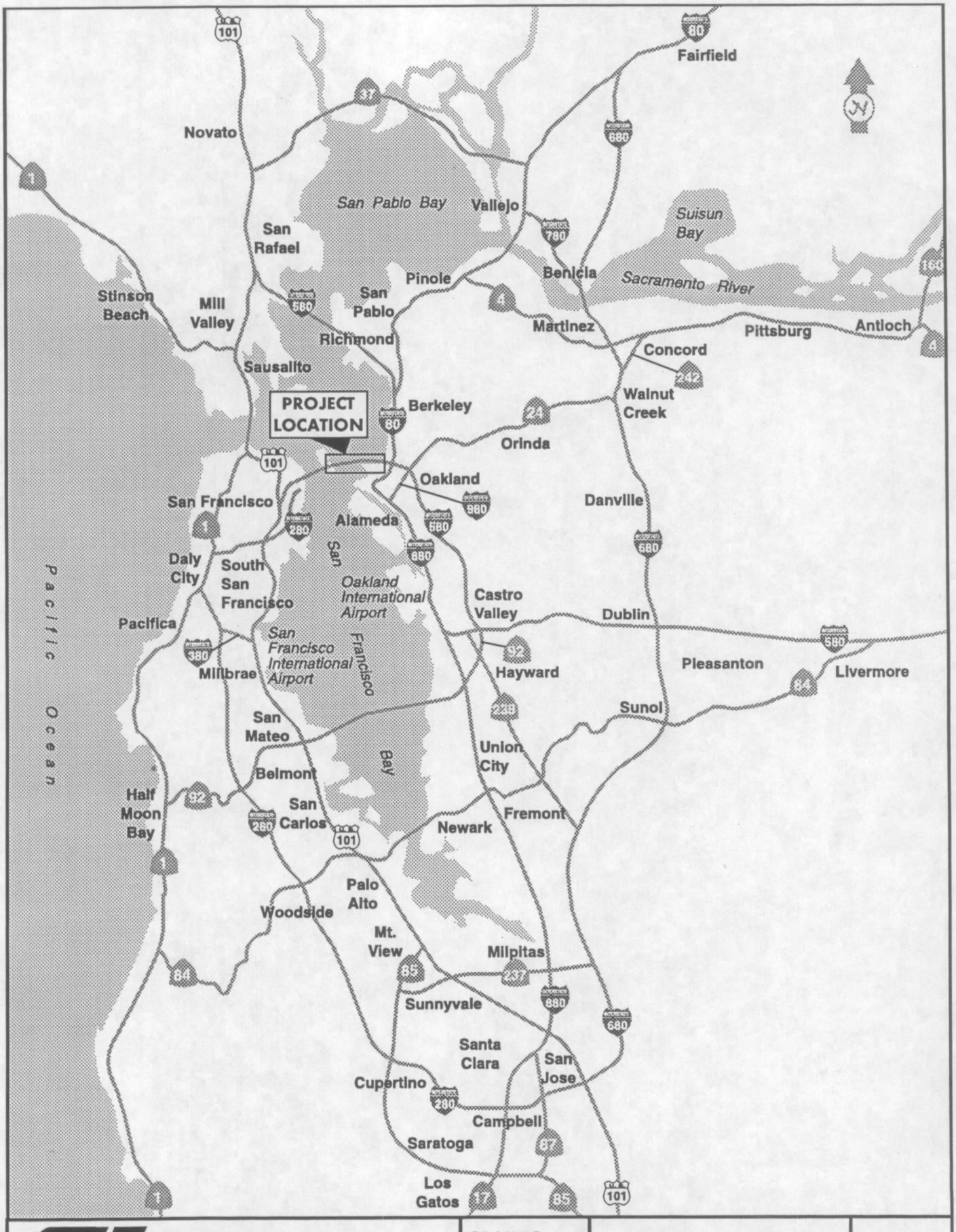


SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

NO SCALE
VERTICAL EXAGGERATED

San Francisco–Oakland
Bay Bridge–Related Projects
Figure 1-1

PBQ&D F-RP 9/6/98

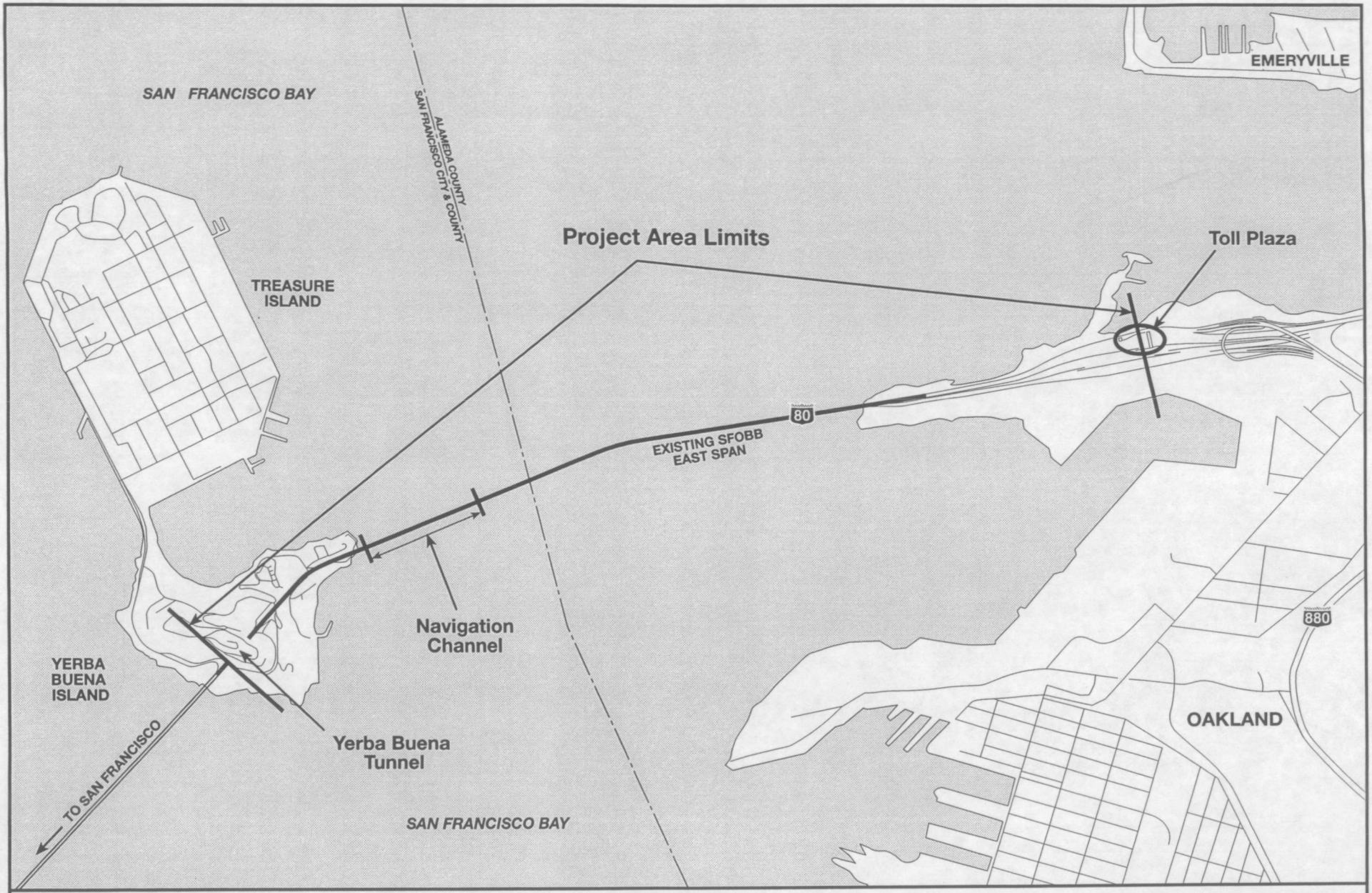


SFOBB EAST SPAN SEISMIC SAFETY PROJECT

GRAPHIC SCALE 0 10km

Project Location

Figure 2-1



SFOBB EAST SPAN SEISMIC SAFETY PROJECT

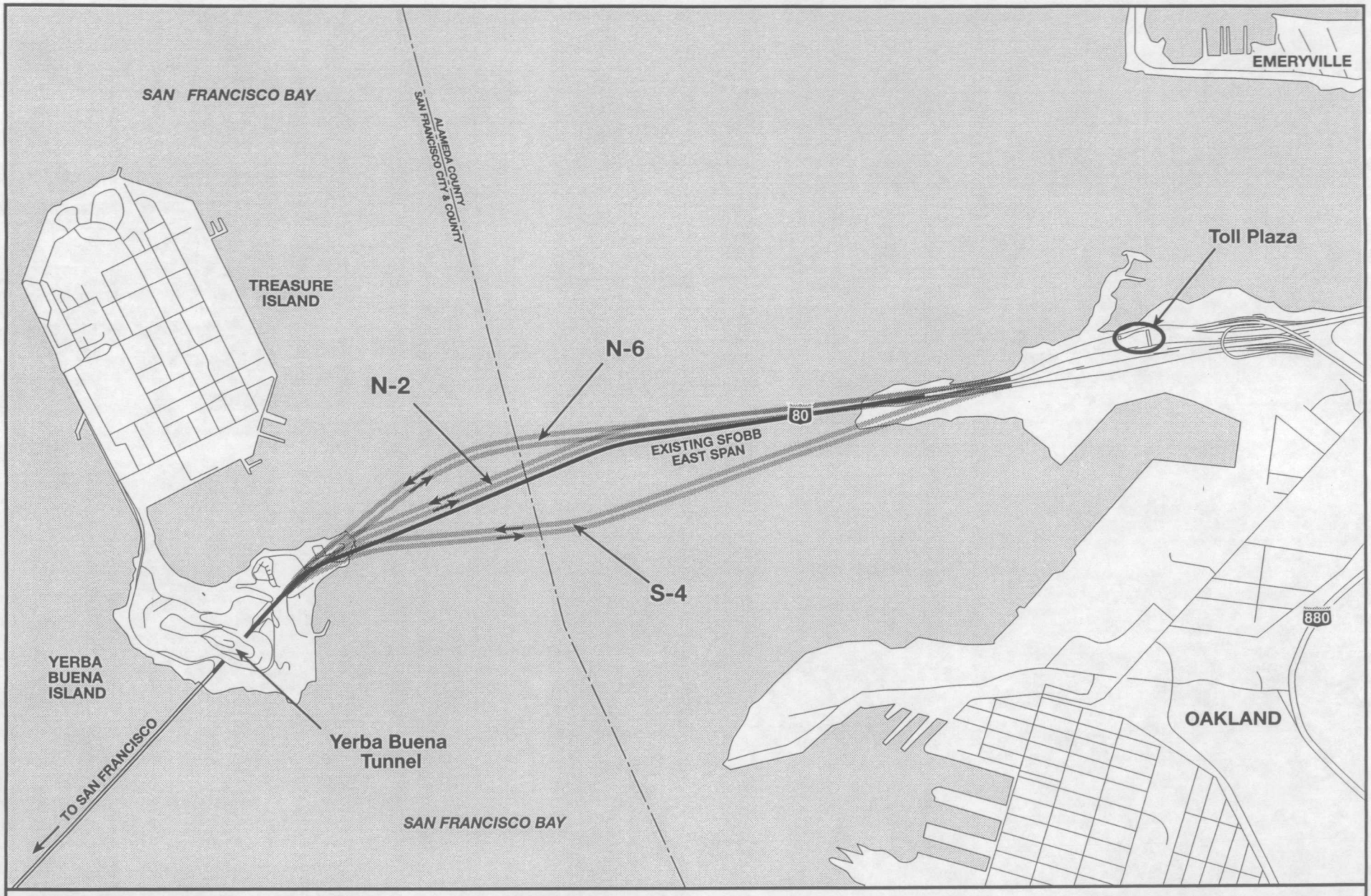
GRAPHIC SCALE 1:27,500

0 250 500 1000 m

Project Area Limits

Figure 2-2

PBQ&D F-2 9/8/98



SFOBB EAST SPAN SEISMIC SAFETY PROJECT

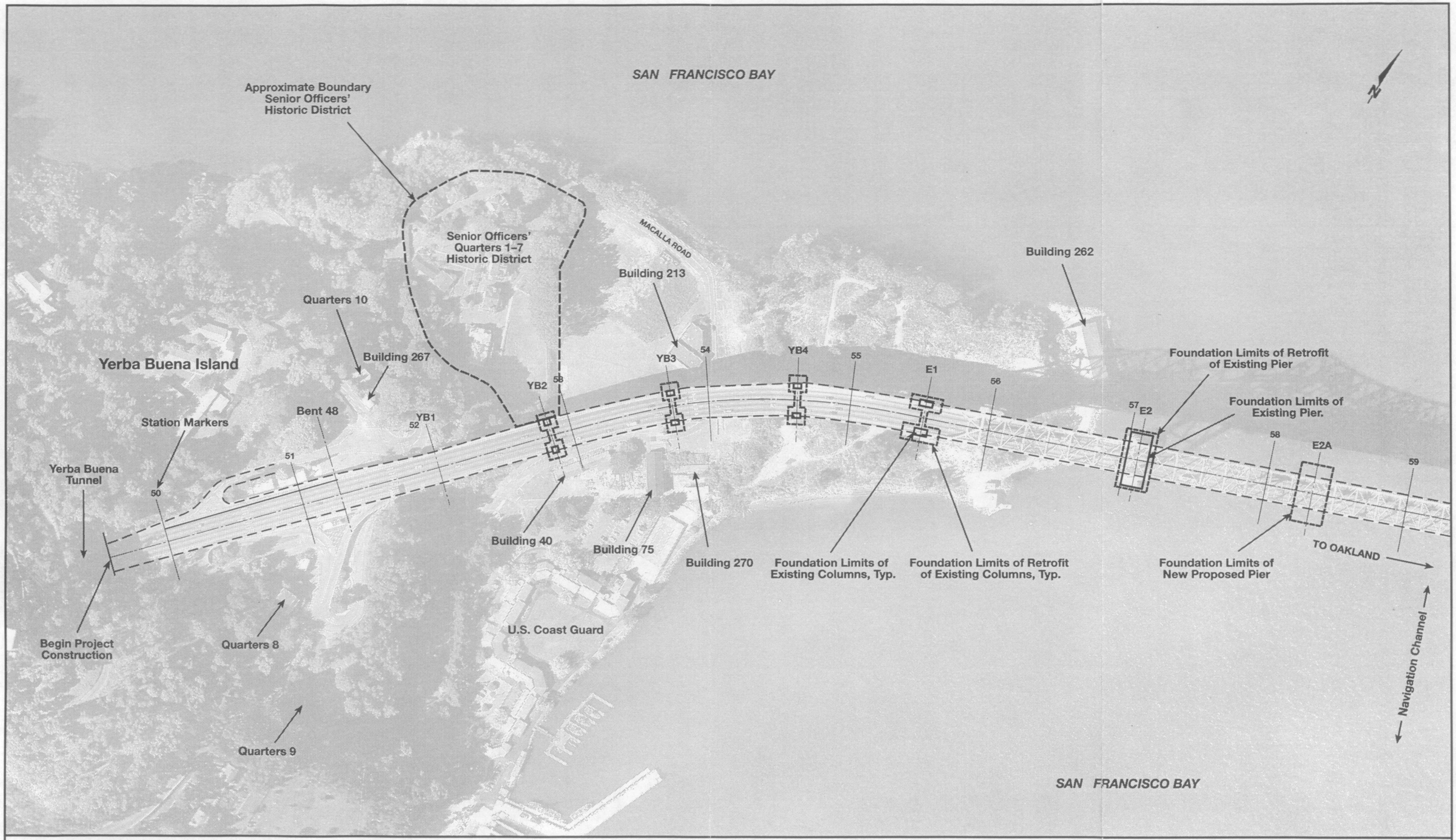
GRAPHIC SCALE 1:27,500

0 250 500 1000 m

Project Alternatives

Figure 2-3

PBQ&D F-231 9/8/98



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500

0 100 200 300 m

Conceptual Retrofit Existing Structure Alignment

Figure 2-4.1

PBQ&D F-ALIGN 9/15/98

SAN FRANCISCO BAY

Navigation Channel

TO YERBA BUENA ISLAND

59 60 E2B 61 E3 62 E4 63 64 E5 65 66 E6 67 E7 68

Foundation Limits of Existing Pier, Typ.

TO OAKLAND

Foundation Limits of New Proposed Pier

Foundation Limits of Retrofit of Existing Pier, Typ.

SAN FRANCISCO BAY

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500

0 100 200 300 m

Conceptual Retrofit Existing Structure Alignment

Figure 2-4.2

PBQ&D F-ALIGN 9/11/98

SAN FRANCISCO BAY

N

Foundation Limits of
Existing Pier, Typ.

TO YERBA BUENA ISLAND

E8 69 70 E9 71 E10 72 E11 73 E12 74 E13 75 E14 76 E15 77 E16 78 E17 79 E18

TO OAKLAND

Foundation Limits of Retrofit
of Existing Pier, Typ.

SAN FRANCISCO BAY

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500
0 100 200 300 m

Conceptual Retrofit Existing
Structure Alignment
Figure 2-4.3

PBQ&D F-ALIGN 9/11/98

SAN FRANCISCO BAY

N

Foundation Limits of
Existing Pier, Typ.

← TO YERBA BUENA ISLAND

E18 79 E19 80 E20 81 E21 82 E22 83 E23 84

Foundation Limits of Retrofit
of Existing Pier, Typ.

Oakland Touchdown Area

Caltrans Maintenance Road

BURMA ROAD

SAN FRANCISCO BAY

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

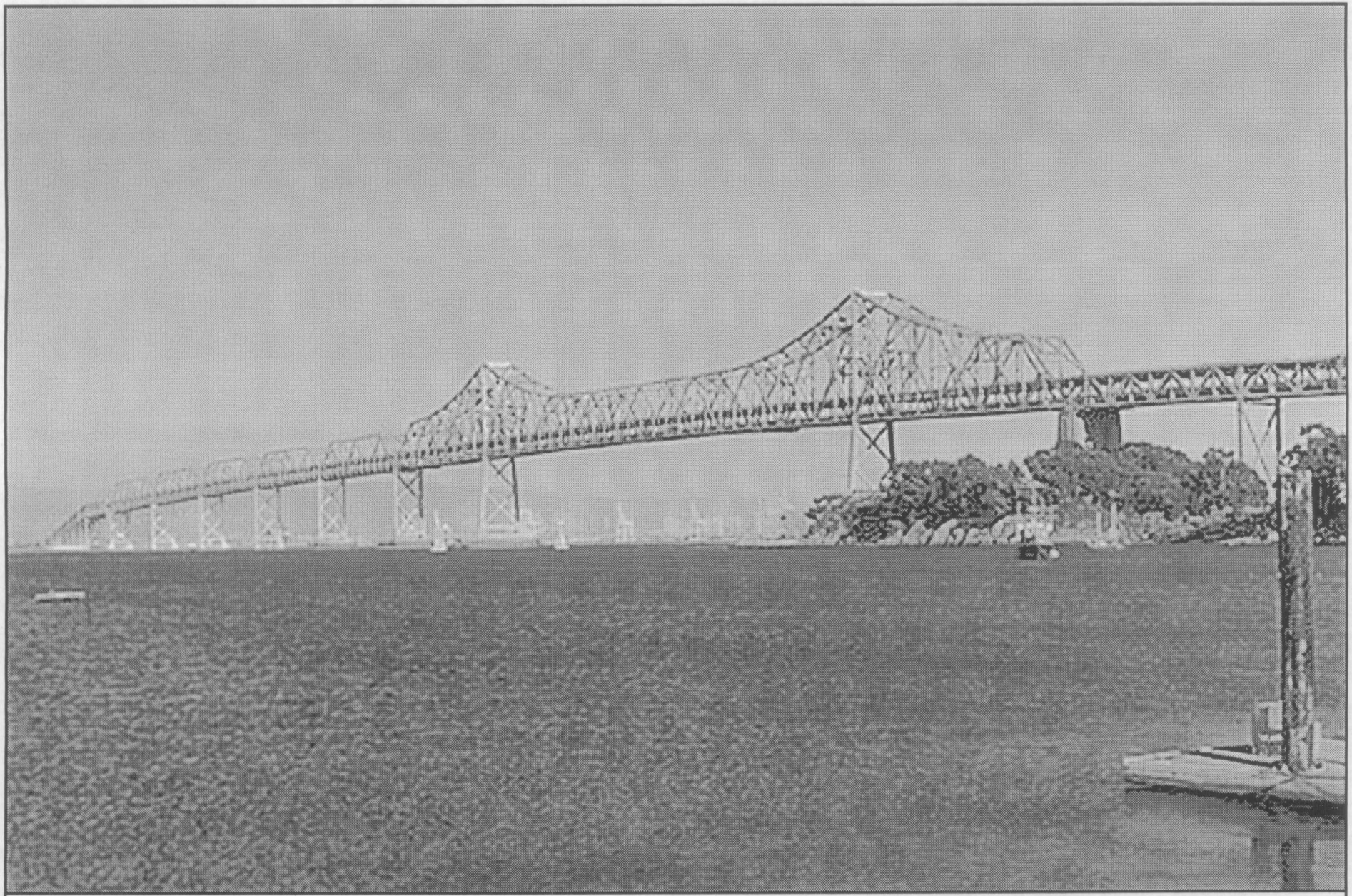
GRAPHIC SCALE 1:2,500

0 100 200 300 m

Conceptual Retrofit Existing
Structure Alignment

Figure 2-4.4

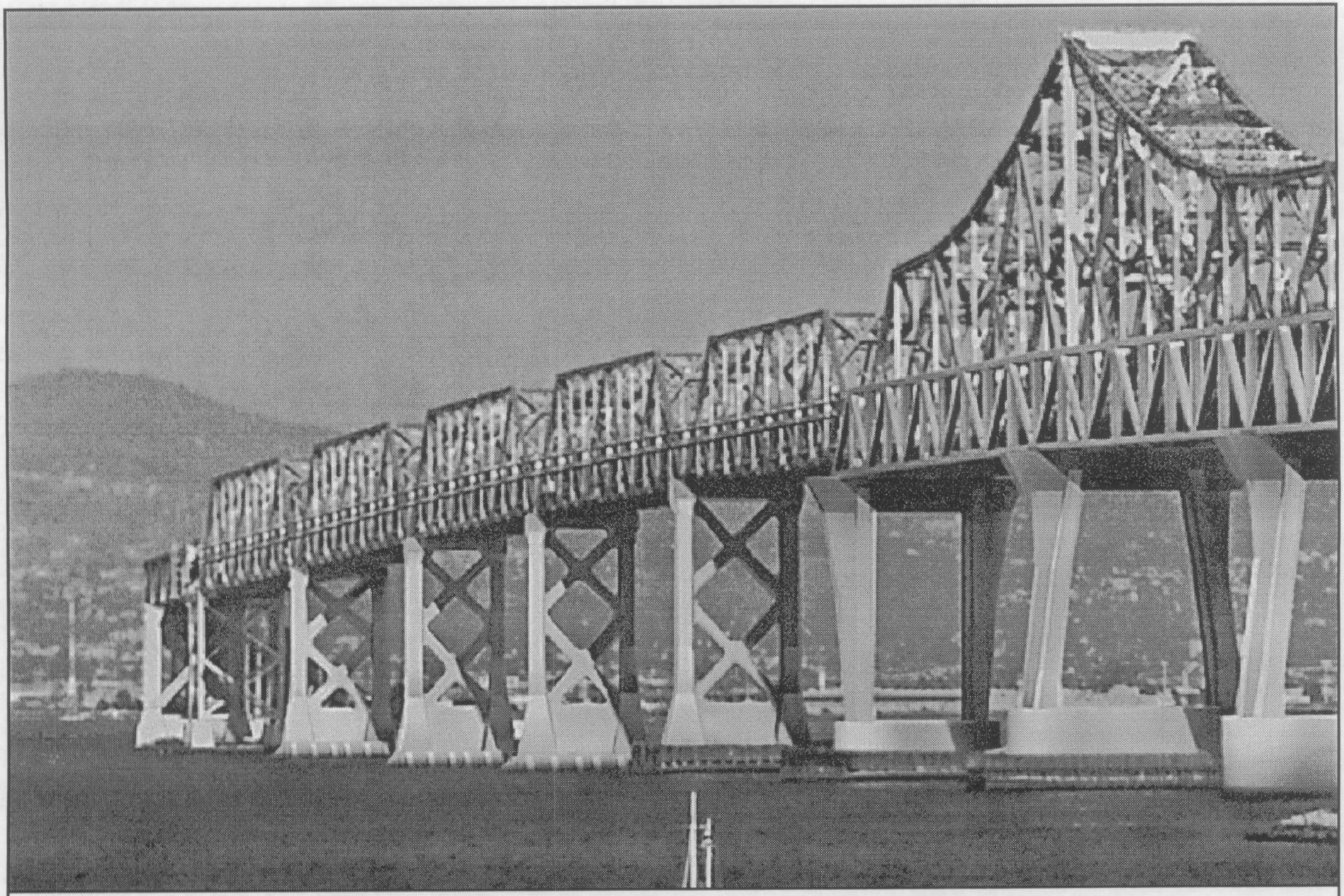
PBQ&D F-ALIGN 9/11/98



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

View of Existing Bridge

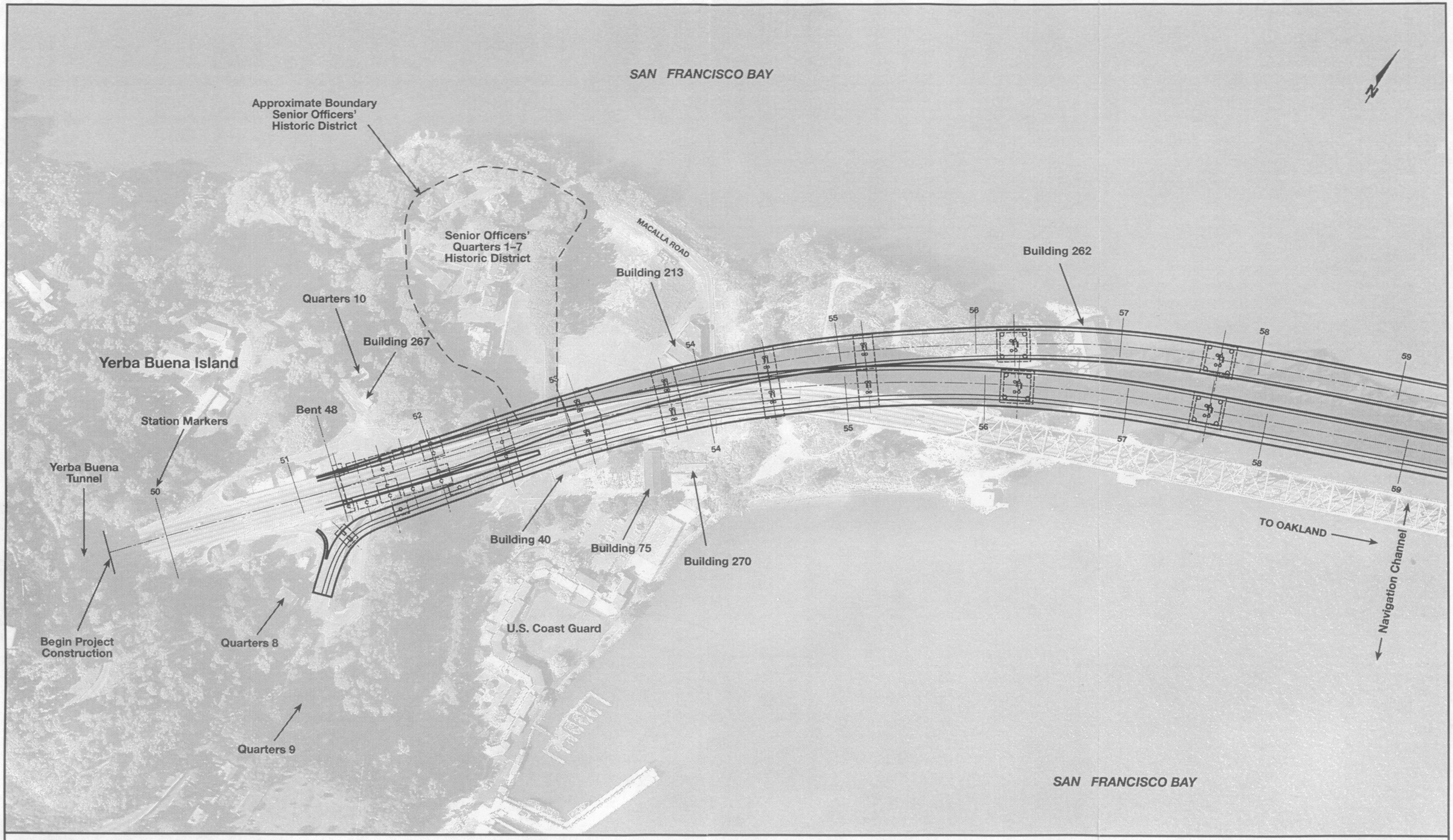
Figure 2-5



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Photo Simulation Retrofit Existing Bridge Design

Figure 2-6



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500

0 100 200 300 m

Conceptual N-2 Alignment
Suspension/Cable-Stayed Structure Variation

Figure 2-7.1a

PBQ&D F-ALIGN 9/15/98

SAN FRANCISCO BAY

Approximate Boundary
Senior Officers'
Historic District

Senior Officers'
Quarters 1–7
Historic District

MACALLA ROAD

Building 213

Building 262

Navigation Channel

Quarters 10

Building 267

Yerba Buena Island

Bent 48

Station Markers

Yerba Buena
Tunnel

Building 40

Building 75

Building 270

TO OAKLAND

Begin Project
Construction

Quarters 8

U.S. Coast Guard

Quarters 9

SAN FRANCISCO BAY

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500
0 100 200 300 m

Conceptual N-2 Alignment
Skyway Structure Variation

Figure 2-7.1b

PBQ&D F-ALIGN 9/15/98

SAN FRANCISCO BAY

N

Navigation Channel

TO YERBA BUENA ISLAND

59 60 61 62 63 64 65 66 67 68 69

TO OAKLAND

Proposed Foundation Limits–
Main Tower Support

SAN FRANCISCO BAY

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500

0 100 200 300 m

Conceptual N-2 Alignment
Cable-Stayed Structure Variation

Figure 2-7.2b

PBQ&D F-ALIGN 9/11/98

SAN FRANCISCO BAY

Navigation Channel

59 60 61 62 63 64 65 66 67 68 69

SAN FRANCISCO BAY

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500
0 100 200 300 m

Conceptual N-2 Alignment
Skyway Structure Variation

Figure 2-7.2c

PBQ&D F-ALIGN 9/11/98

SAN FRANCISCO BAY

N

TO YERBA BUENA ISLAND

70 71 72 73 74 75 76 77 78 79

TO OAKLAND

SAN FRANCISCO BAY

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500

0 100 200 300 m

Conceptual N-2 Alignment
All Design Variations

Figure 2-7.3

PBQ&D F-ALIGN 9/11/98

SAN FRANCISCO BAY

N

79 80 81 82 83 84 85 86 87 88 89

Proposed Caltrans Maintenance Road

Oakland Touchdown Area

Caltrans Maintenance Road

BURMA ROAD

SAN FRANCISCO BAY

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

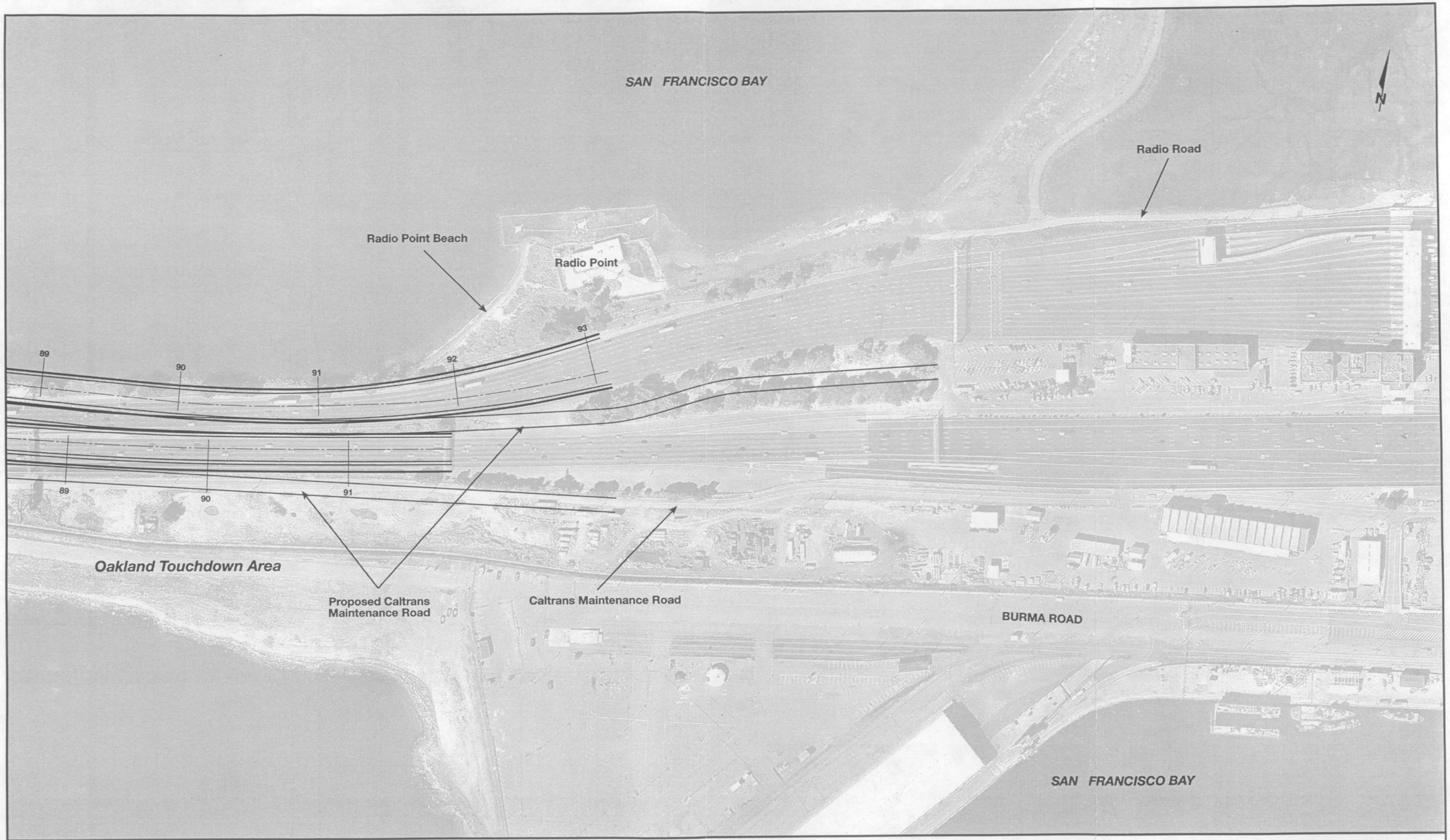
GRAPHIC SCALE 1:2,500

0 100 200 300 m

Conceptual N-2 Alignment
All Design Variations

Figure 2-7.4

PBQ&D F-ALIGN 9/12/98

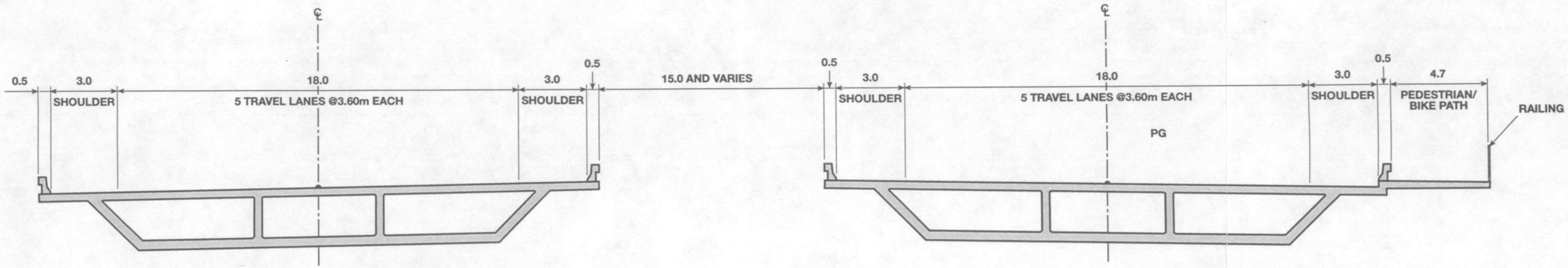


SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500
0 100 200 300 m

Conceptual N-2 Alignment
All Design Variations
Figure 2-7.5

PBQ&D F-ALIGN 9/11/98



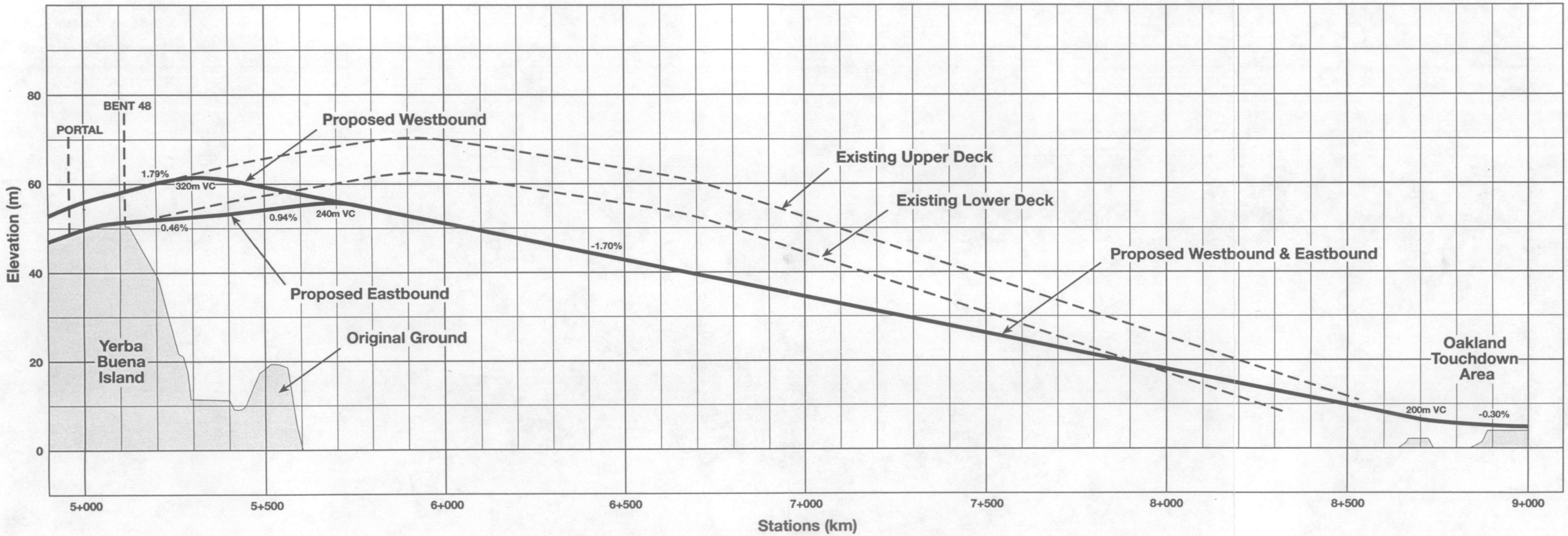
Westbound Roadway

Eastbound Roadway, with Pedestrian/Bike Path

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Typical Cross Sections

Figure 2-8



SFOBB EAST SPAN SEISMIC SAFETY PROJECT

NO SCALE

Conceptual Alignment Profile

Figure 2-9

PBQ&D F-P1 9/9/98

SAN FRANCISCO BAY

Approximate Boundary
Senior Officers'
Historic District

Senior Officers'
Quarters 1–7
Historic District

MACALLA ROAD

Proposed Foundation Limits–
Main Tower Support

Building 262

Building 213

Quarters 10

Building 267

Yerba Buena Island

Bent 48

Station Markers

Yerba Buena
Tunnel

50 51 52 53 54 55 56 57 58 59

TO OAKLAND

Navigation Channel

Building 40

Building 75

Building 270

U.S. Coast Guard

Begin Project
Construction

Quarters 8

Quarters 9

SAN FRANCISCO BAY

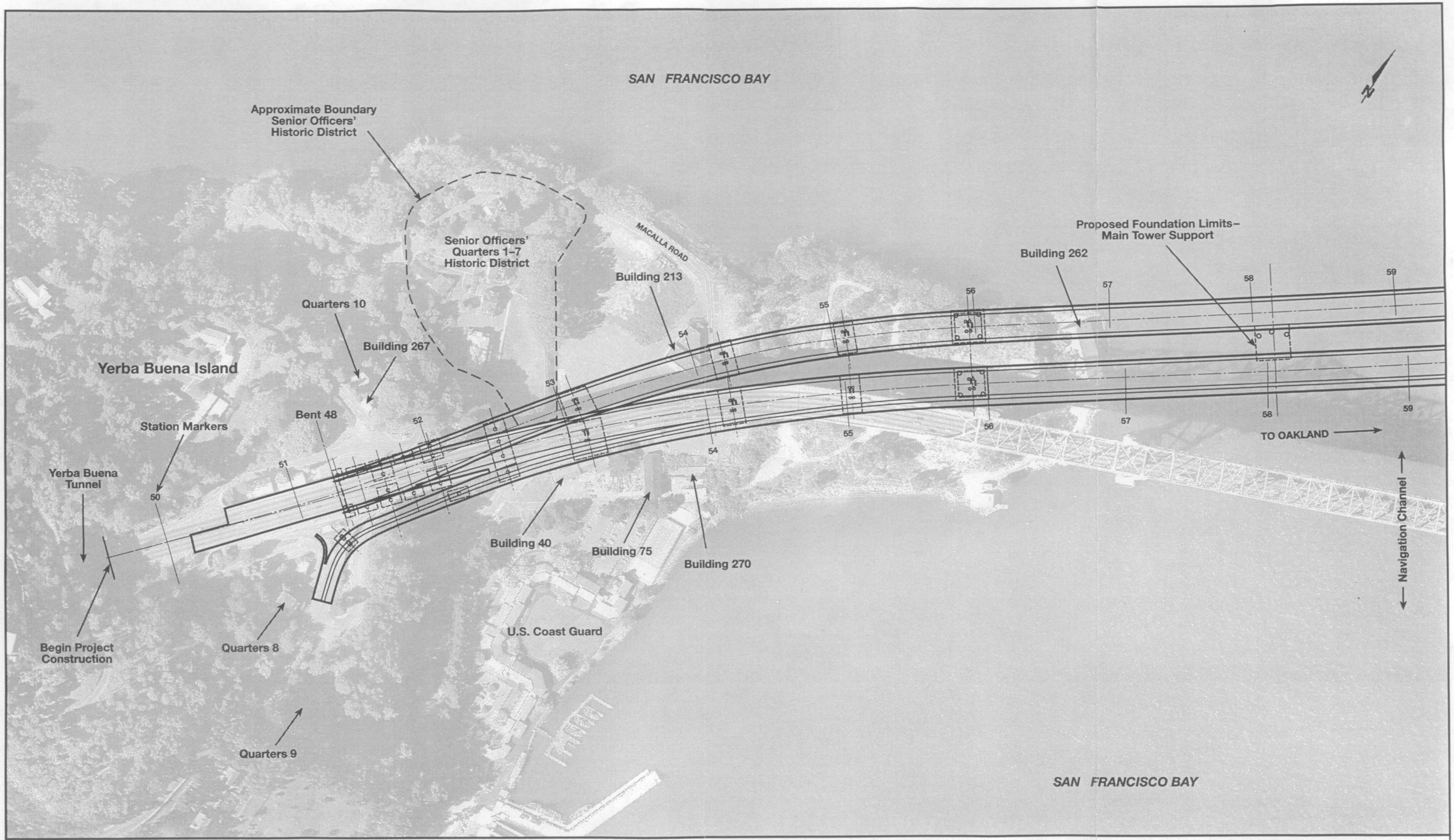
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500
0 100 200 300 m

Conceptual N-6 Alignment
Suspension Structure Variation

Figure 2-10.1a

PBQ&D F-ALIGN 9/15/98



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

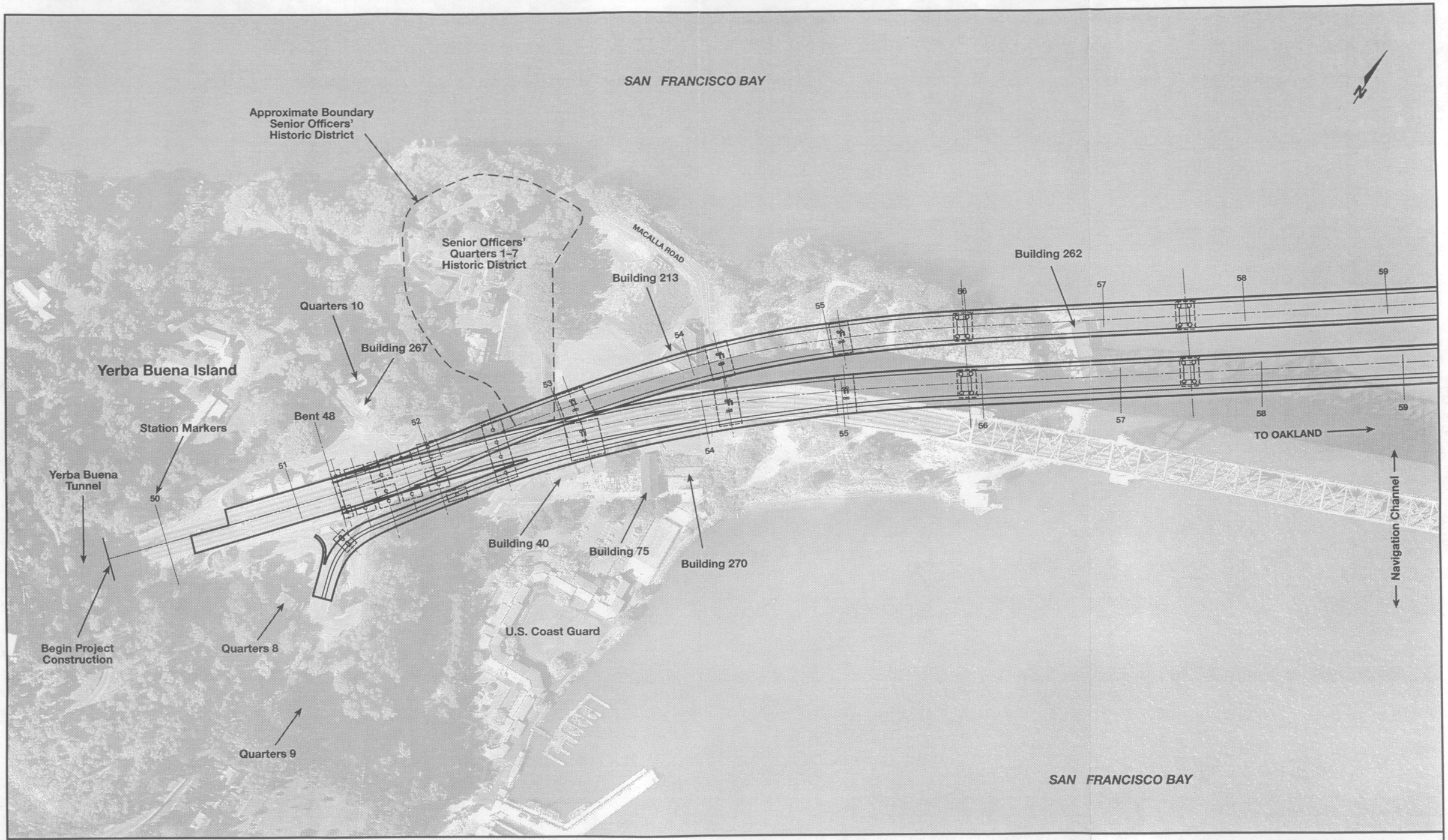
GRAPHIC SCALE 1:2,500

0 100 200 300 m

Conceptual N-6 Alignment
Cable-Stayed Structure Variation

Figure 2-10.1b

PBQ&D F-ALIGN 9/15/98



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

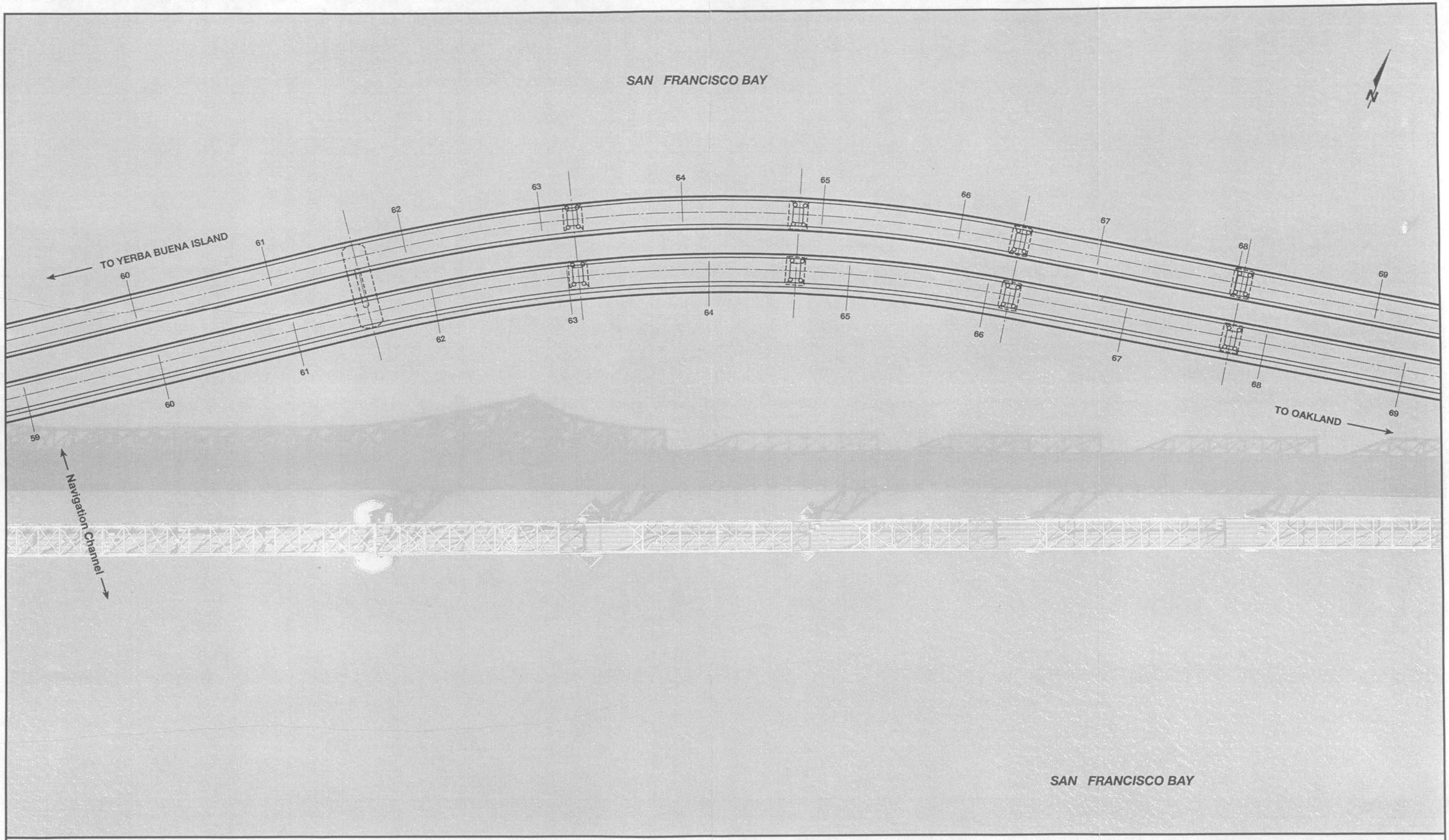
GRAPHIC SCALE 1:2,500

0 100 200 300 m

Conceptual N-6 Alignment
Skyway Structure Variation

Figure 2-10.1c

PBQ&D F-ALIGN 9/15/98



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500
0 100 200 300 m

Conceptual N-6 Alignment
Suspension Structure Variation
Figure 2-10.2a

PBQ&D F-ALIGN 9/11/98

SAN FRANCISCO BAY

N

TO YERBA BUENA ISLAND

60 61 62 63 64 65 66 67 68 69

TO OAKLAND

Navigation Channel

SAN FRANCISCO BAY

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500
0 100 200 300 m

Conceptual N-6 Alignment
Cable-Stayed Structure Variation
Figure 2-10.2b

PBQ&D F-ALIGN 9/11/98

SAN FRANCISCO BAY

N

TO YERBA BUENA ISLAND

59 60 61 62 63 64 65 66 67 68 69

TO OAKLAND

Navigation Channel

SAN FRANCISCO BAY

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500

0 100 200 300 m

Conceptual N-6 Alignment
Skyway Structure Variation

Figure 2-10.2c

PBQ&D F-ALIGN 9/11/98

SAN FRANCISCO BAY

N

TO YERBA BUENA ISLAND

70 71 72 73 74 75 76 77 78 79 80

TO OAKLAND

SAN FRANCISCO BAY

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500

0 100 200 300 m

Conceptual N-6 Alignment
Suspension/Skyway Structure Variation

Figure 2-10.3a

PBQ&D F-ALIGN 9/11/98

SAN FRANCISCO BAY

N

TO YERBA BUENA ISLAND

70 71 72 73 74 75 76 77 78 79 80

TO OAKLAND

SAN FRANCISCO BAY

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500
0 100 200 300 m

Conceptual N-6 Alignment
Cable-Stayed Structure Variation

Figure 2-10.3b

PBQ&D F-ALIGN 9/11/98

SAN FRANCISCO BAY

N

80 81 82 83 84 85 86 87 88 89

Proposed Caltrans Maintenance Road

Oakland Touchdown Area

Caltrans Maintenance Road

BURMA ROAD

SAN FRANCISCO BAY

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

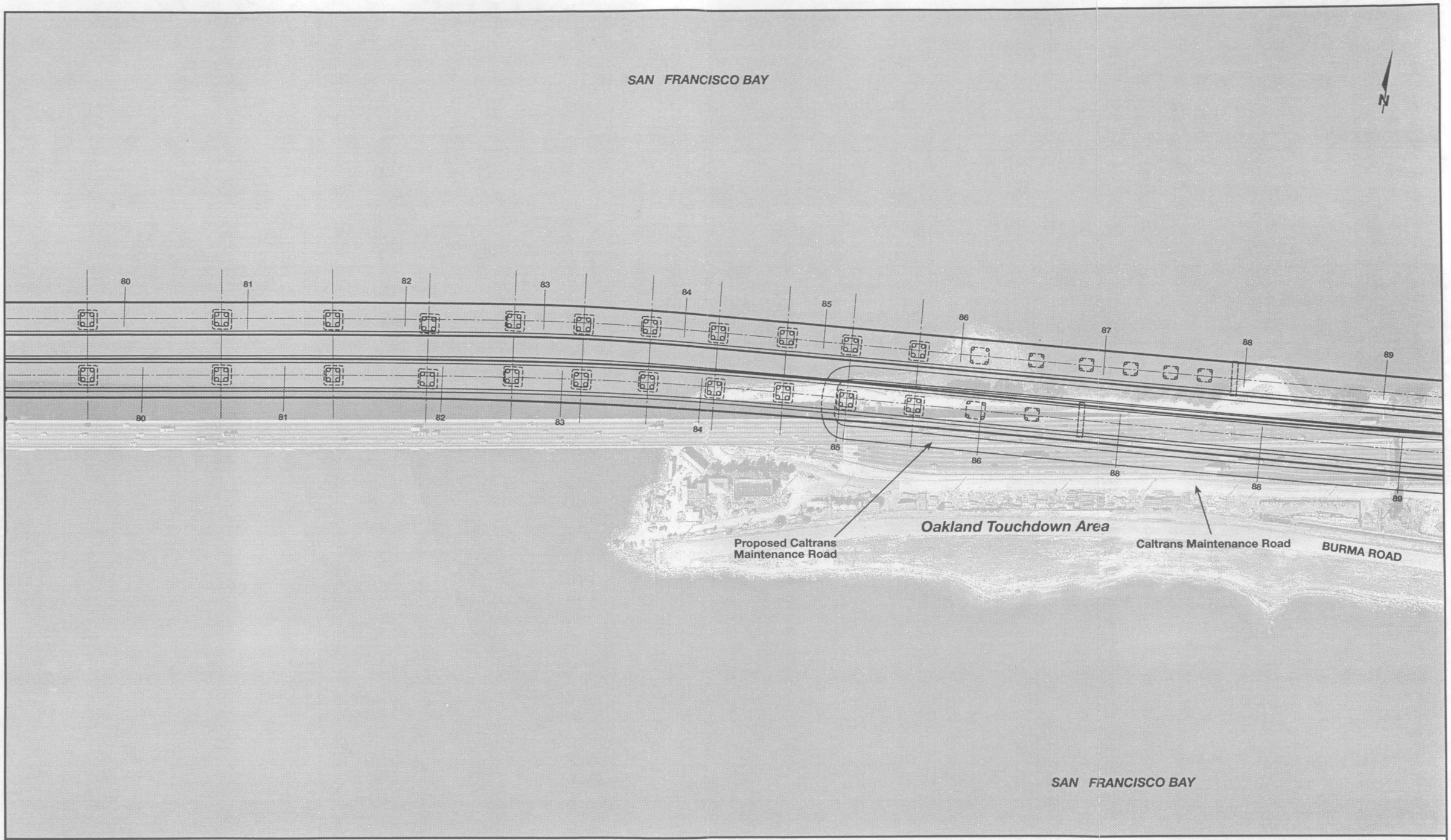
GRAPHIC SCALE 1:2,500

0 100 200 300 m

Conceptual N-6 Alignment
Suspension/Skyway Structure Variation

Figure 2-10.4a

PBQ&D F-ALIGN 9/12/98



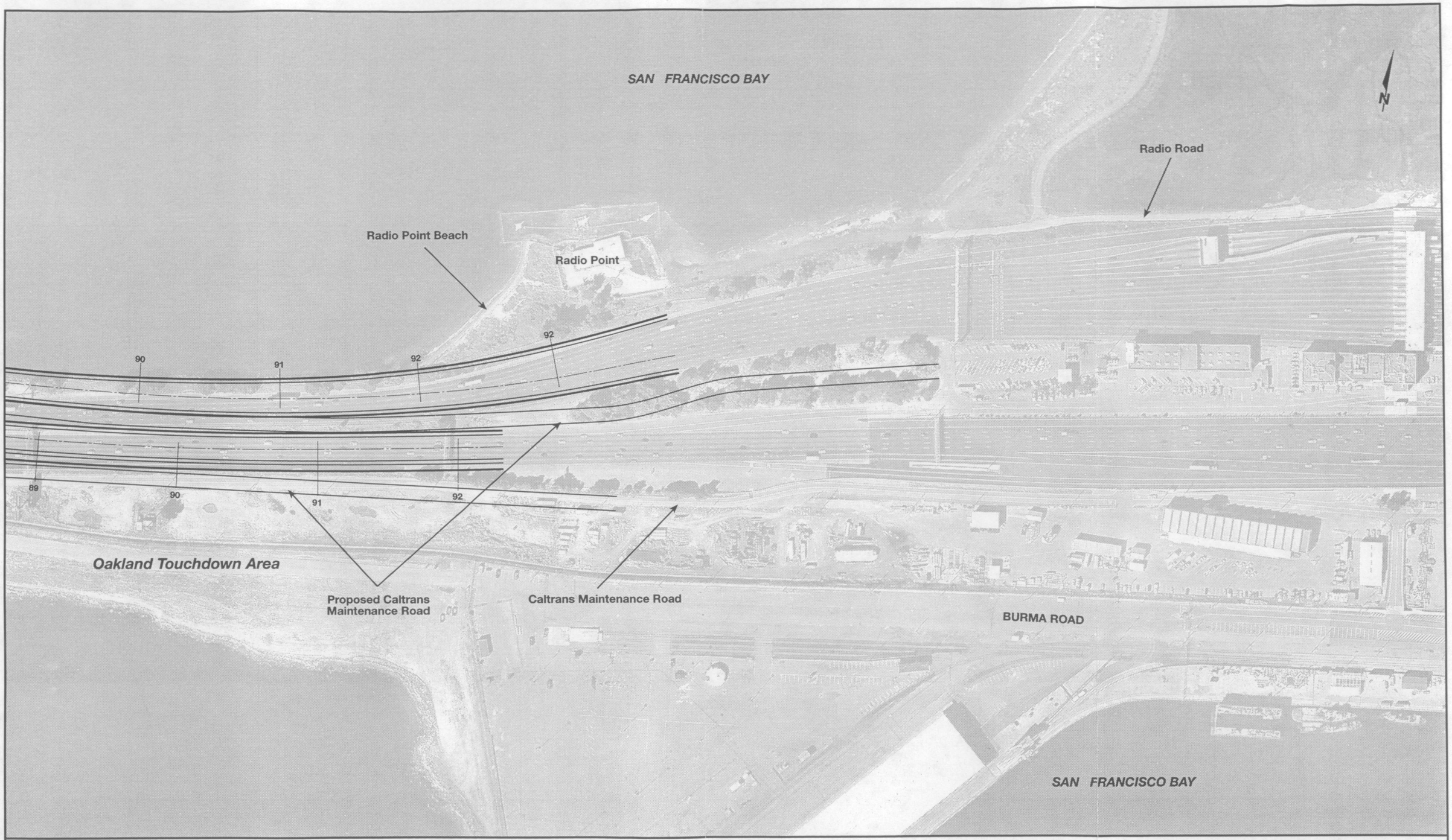
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500
0 100 200 300 m

Conceptual N-6 Alignment
Cable-Stayed Structure Variation

Figure 2-10.4b

PBQ&D F-ALIGN 9/12/98



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

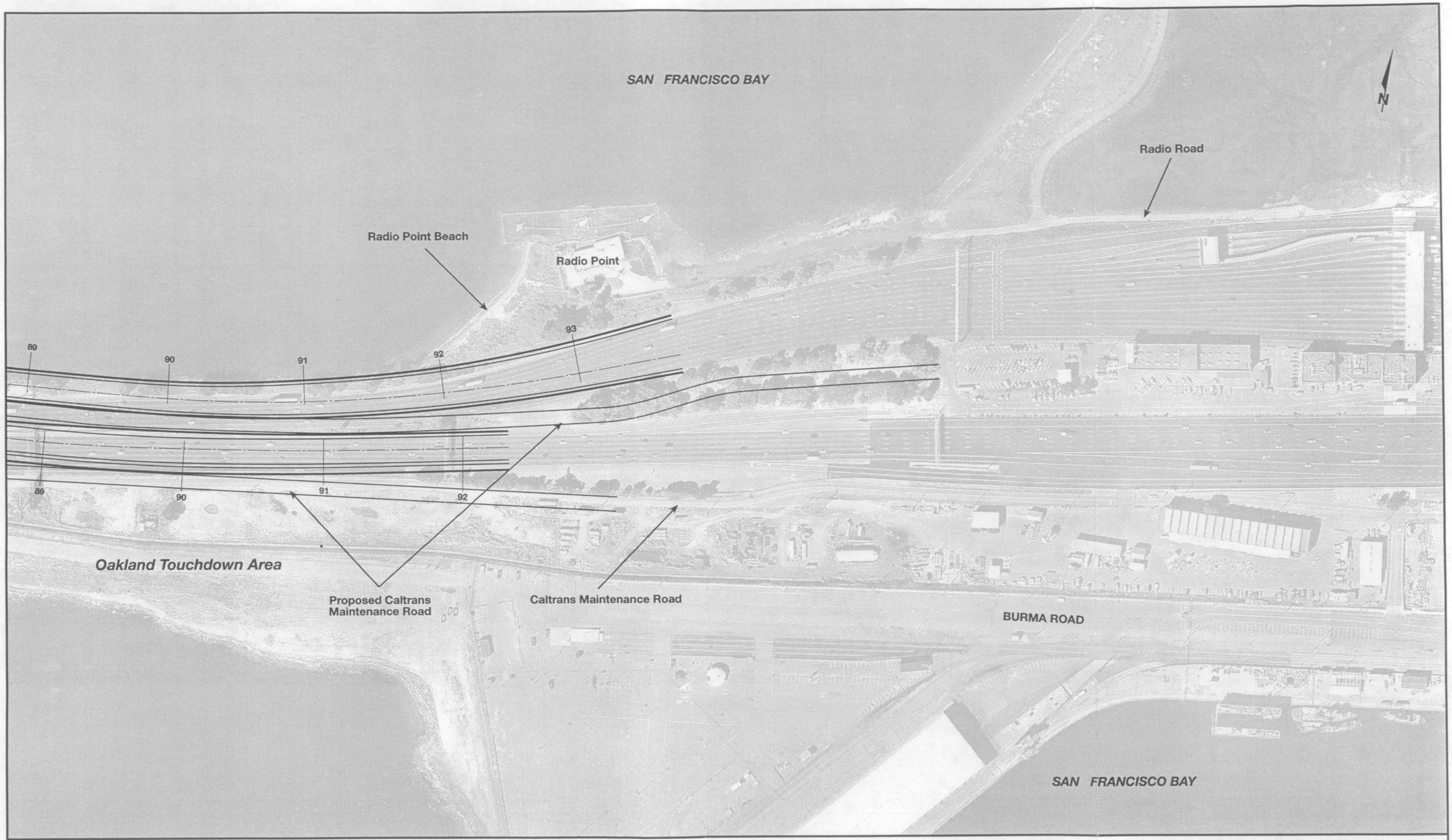
GRAPHIC SCALE 1:2,500

0 100 200 300 m

Conceptual N-6 Alignment
Suspension/Skyway Structure Variation

Figure 2-10.5a

PBQ&D F-ALIGN 9/15/98



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

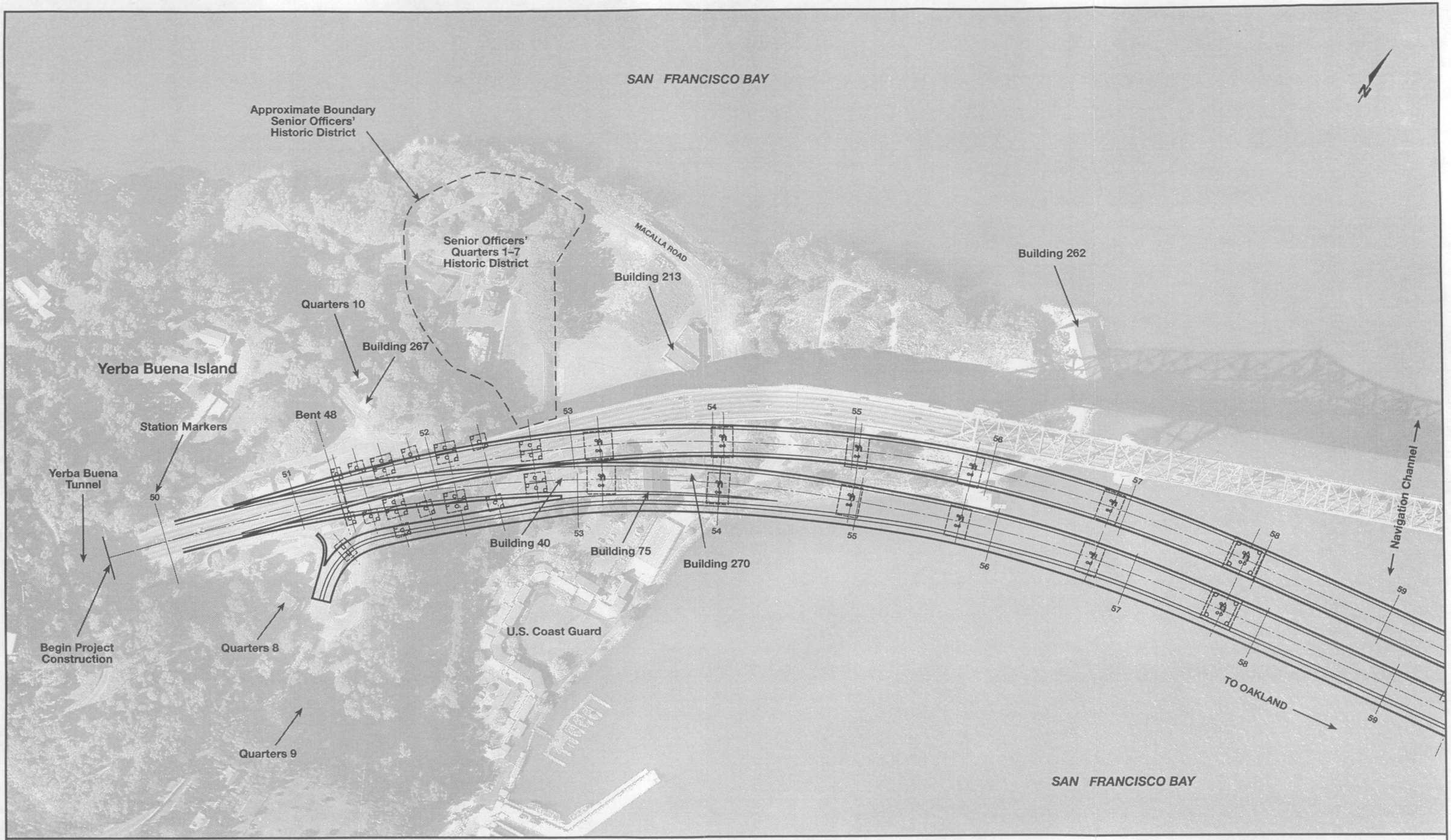
GRAPHIC SCALE 1:2,500

0 100 200 300 m

Conceptual N-6 Alignment
Cable-Stayed Structure Variation

Figure 2-10.5b

PBQ&D F-ALIGN 9/15/98



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500

0 100 200 300 m

Conceptual S-4 Alignment
Suspension/Cable-Stayed Structure Variation

Figure 2-11.1a

PBQ&D F-ALIGN 9/15/98

SAN FRANCISCO BAY

Approximate Boundary
Senior Officers'
Historic District

Senior Officers'
Quarters 1–7
Historic District

MACALLA ROAD

Building 213

Building 262

Quarters 10

Building 267

Yerba Buena Island

Bent 48

Station Markers

Yerba Buena
Tunnel

Building 40

Building 75

Building 270

U.S. Coast Guard

Begin Project
Construction

Quarters 8

Quarters 9

Navigation Channel

TO OAKLAND

SAN FRANCISCO BAY

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500

0 100 200 300 m

Conceptual S-4 Alignment
Skyway Structure Variation

Figure 2-11.1b

PBQ&D F-ALIGN 9/15/98

SAN FRANCISCO BAY

N

TO YERBA BUENA ISLAND

58 59 60 61 62 63 64 65 66 67 68

Navigation Channel

Proposed Foundation Limits–
Main Tower Support

TO OAKLAND

SAN FRANCISCO BAY

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500

0 100 200 300 m

Conceptual S-4 Alignment
Suspension Structure Variation

Figure 2-11.2a

PBQ&D F-ALIGN 9/11/98

SAN FRANCISCO BAY

N

TO YERBA BUENA ISLAND

58 59 60 61 62 63 64 65 66 67 68

Proposed Foundation Limits–
Main Tower Support

Navigation Channel

TO OAKLAND

SAN FRANCISCO BAY

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500
0 100 200 300 m

Conceptual S-4 Alignment
Cable-Stayed Structure Variation

Figure 2-11.2b

PBQ&D F-ALIGN 9/11/98

SAN FRANCISCO BAY

N

TO YERBA BUENA ISLAND

58 59 60 61 62 63 64 65 66 67

Navigation Channel

TO OAKLAND

SAN FRANCISCO BAY

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500

0 100 200 300 m

Conceptual S-4 Alignment
Skyway Structure Variation

Figure 2-11.2c

PBQ&D F-ALIGN 9/11/98

SAN FRANCISCO BAY

N

TO YERBA BUENA ISLAND

TO OAKLAND

69 70 71 72 73 74 75 76 77 78

SAN FRANCISCO BAY

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500

0 100 200 300 m

Conceptual S-4 Alignment
All Design Variations

Figure 2-11.3

PBQ&D F-ALIGN 9/11/98

SAN FRANCISCO BAY

N

Caltrans Maintenance Road

Oakland Touchdown Area

TO YERBA BUENA ISLAND

BURMA ROAD

Proposed Caltrans
Maintenance Road

SAN FRANCISCO BAY

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

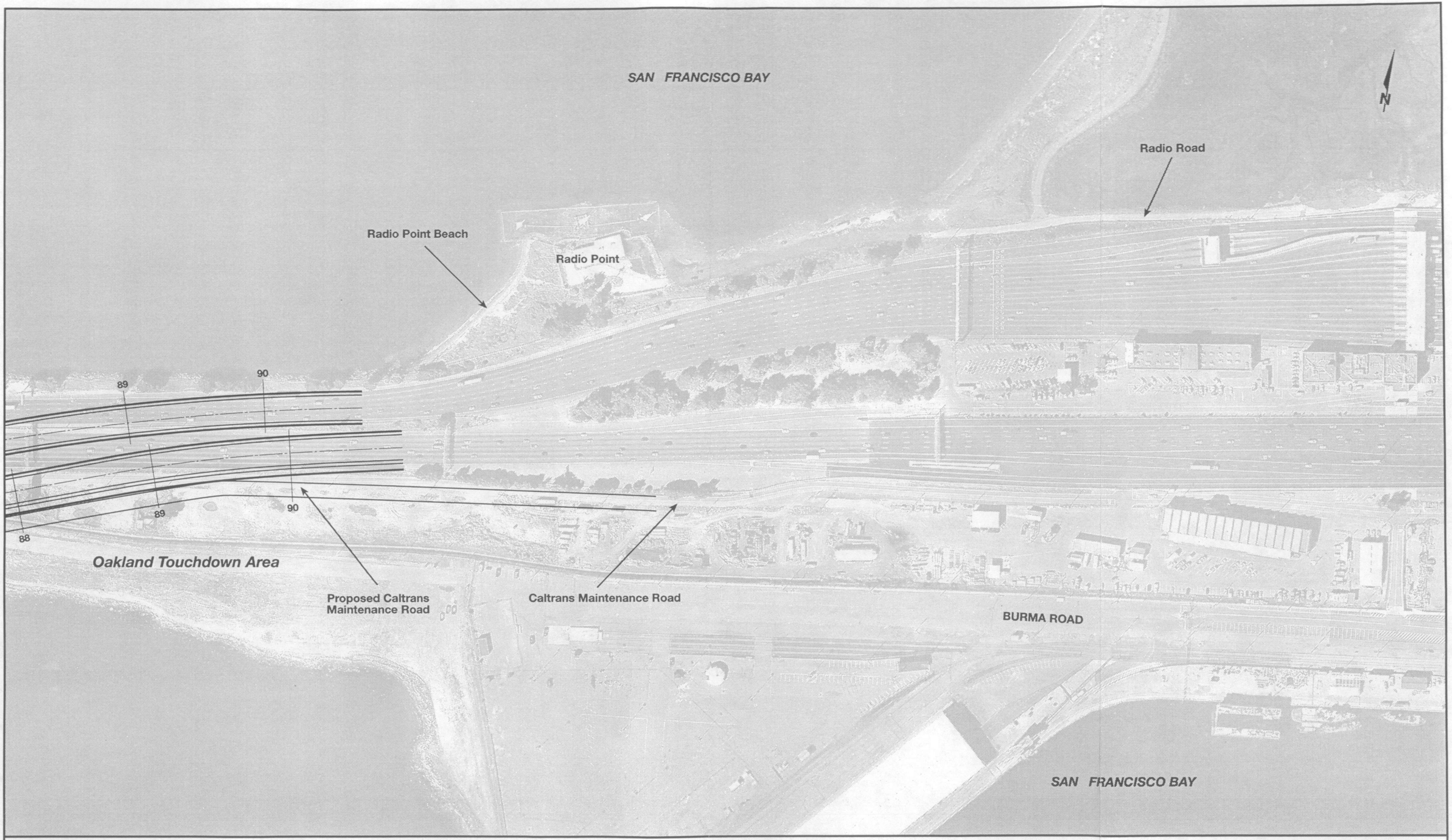
GRAPHIC SCALE 1:2,500

0 100 200 300 m

Conceptual S-4 Alignment
All Design Variations

Figure 2-11.4

PBQ&D F-ALIGN 9/12/98



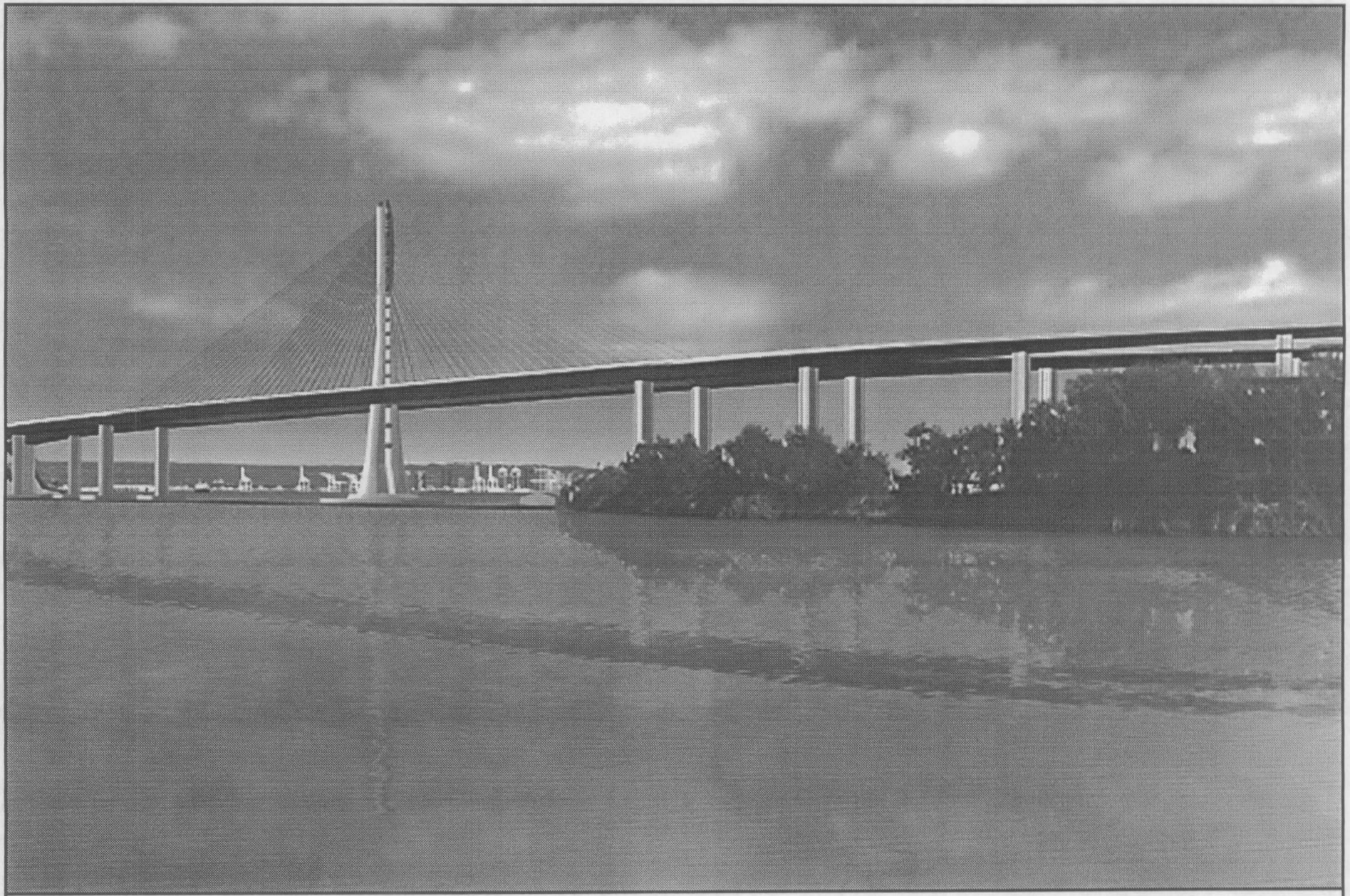
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,500
0 100 200 300 m

Conceptual S-4 Alignment
All Design Variations

Figure 2-11.5

PBQ&D F-ALIGN 9/11/98

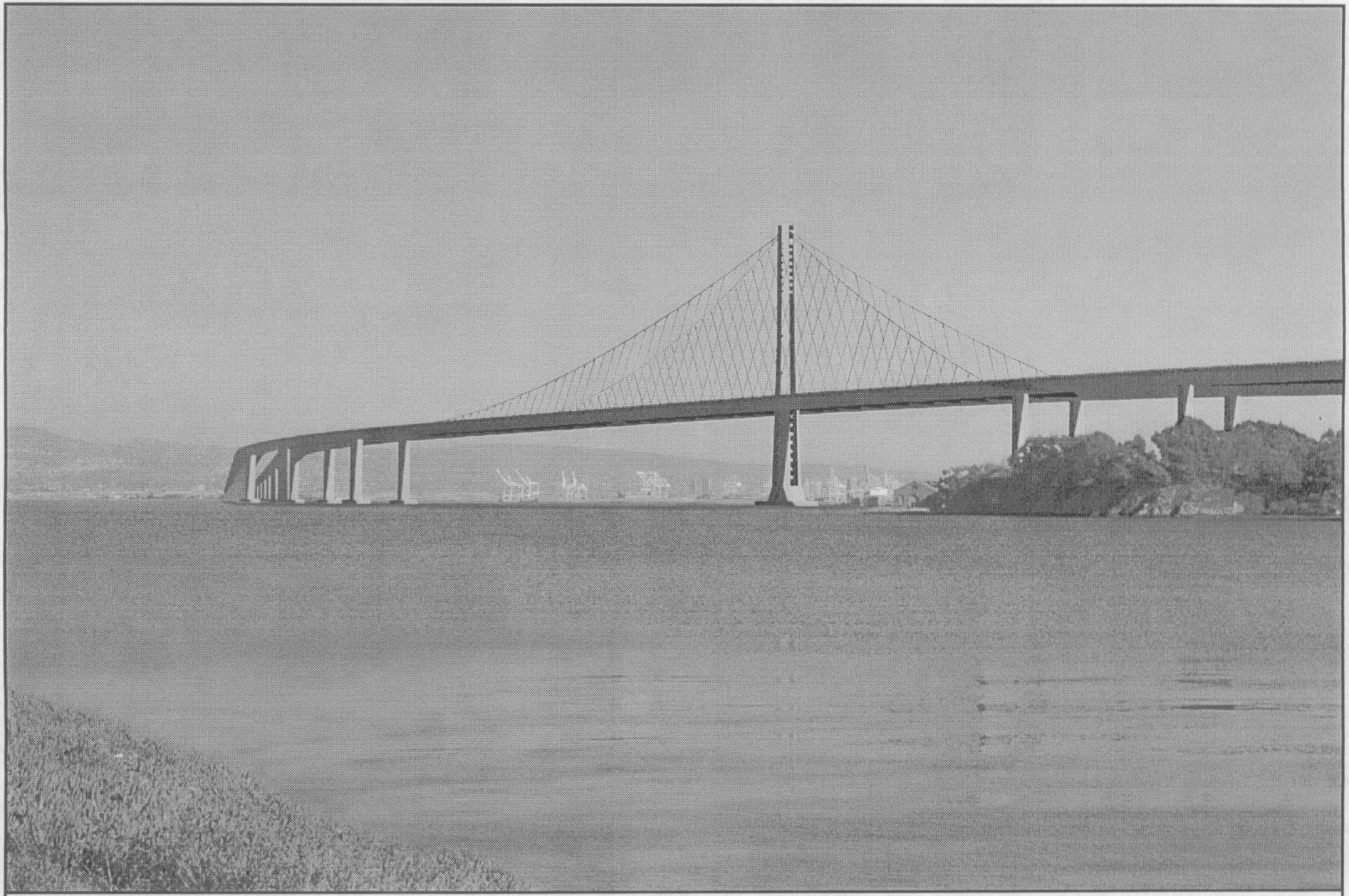


SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Cable Stayed Bridge Design

Figure 2-12

PBQ&D SIM-C 9/8/98



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Suspension Bridge Design

Figure 2-13

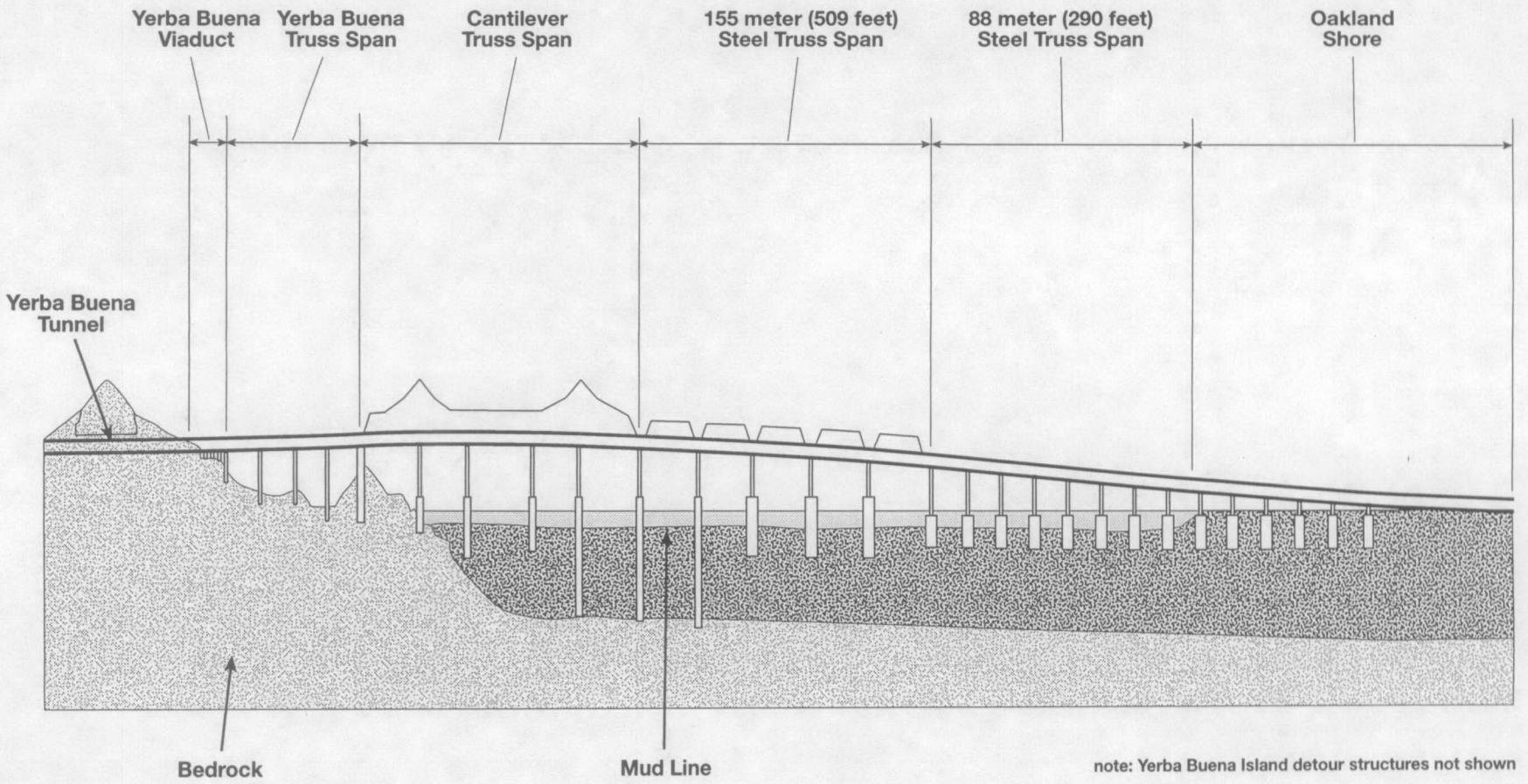
PBQ&D SIM-S 9/8/98

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Skyway Bridge Design

Figure 2-14

PBQ&D SIM-V 9/8/98

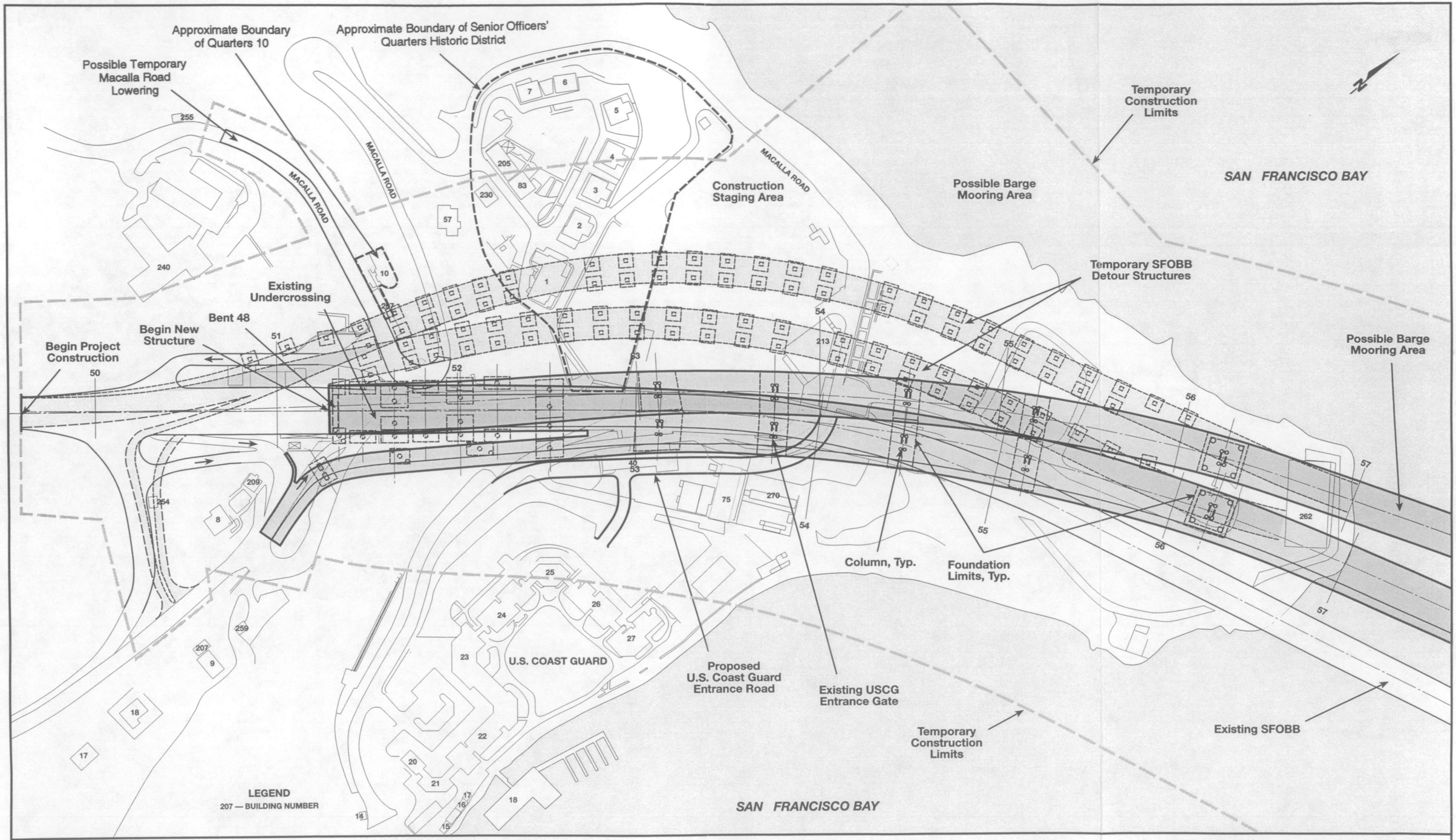


SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

NO SCALE
VERTICAL EXAGGERATED

Major Components of Dismantling Activities

Figure 2-15



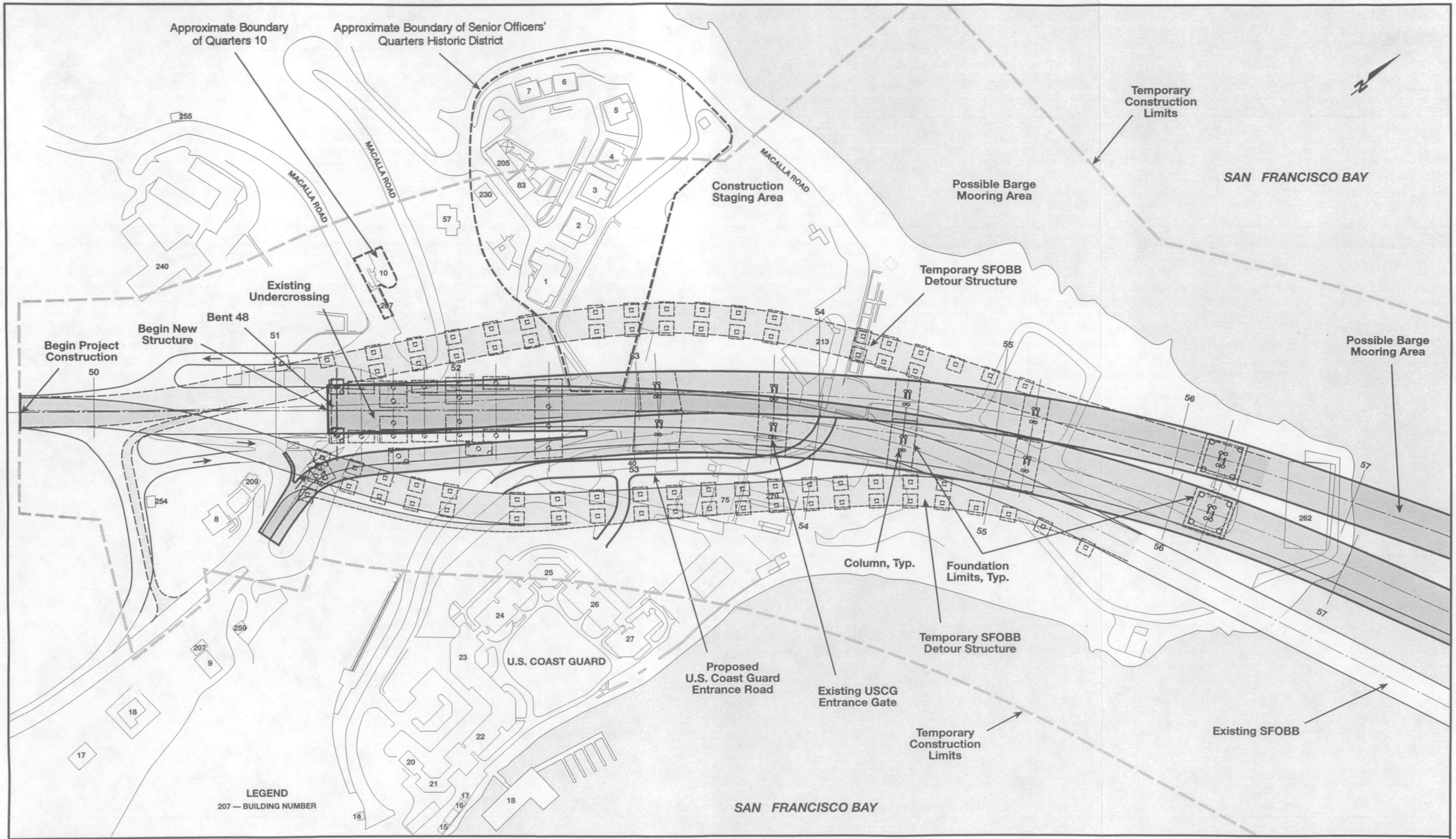
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,000
0 25 50 100 m

Foundation Construction Impact
North Option Alternative N-2

Figure 2-16.1

PBQ&D F-106-N2-N 9/12/98



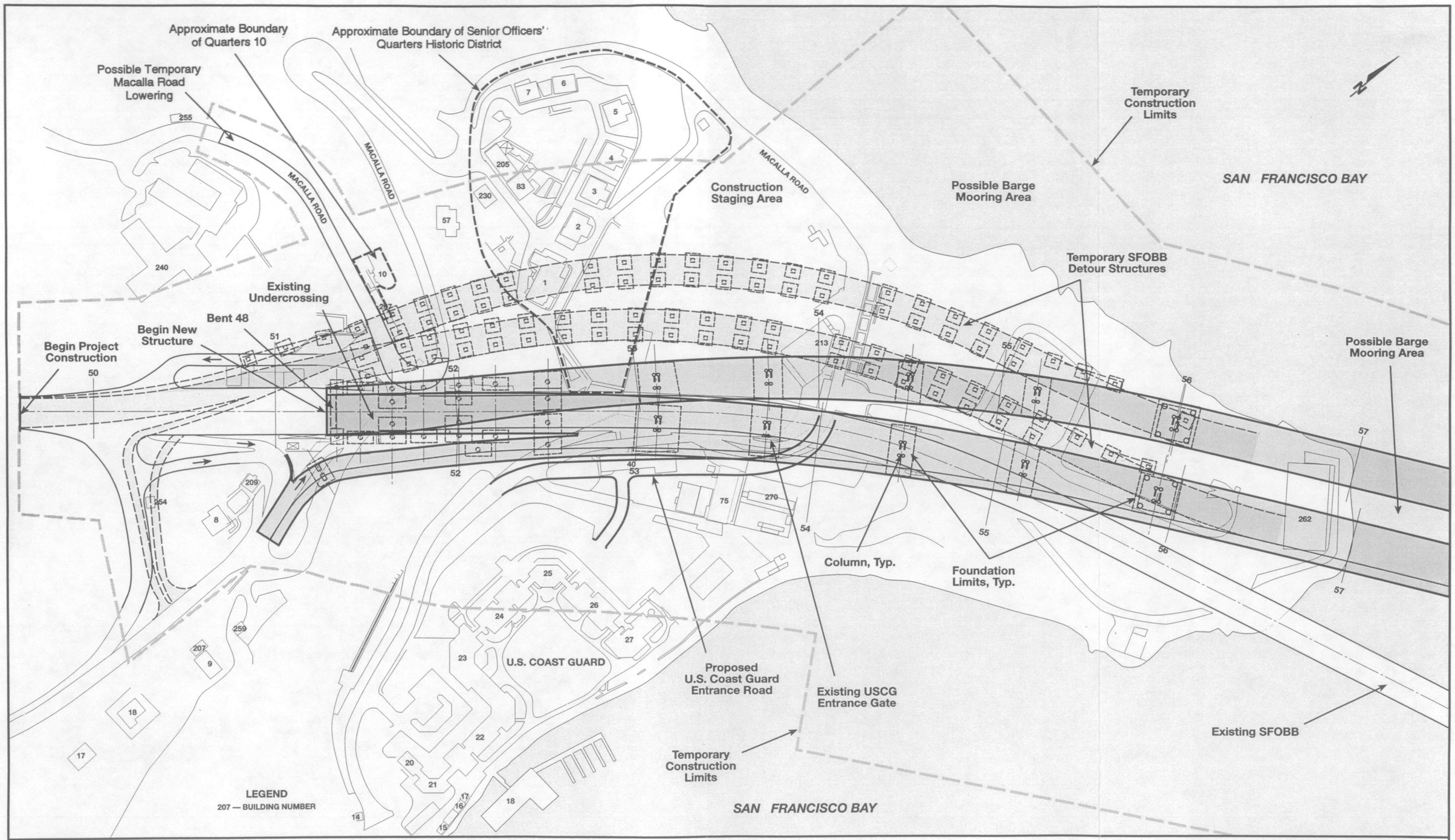
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,000
0 25 50 100 m

Foundation Construction Impact
North-South Option Alternative N-2

Figure 2-16.2

PBQ&D F-106-N2-N/S 9/12/98



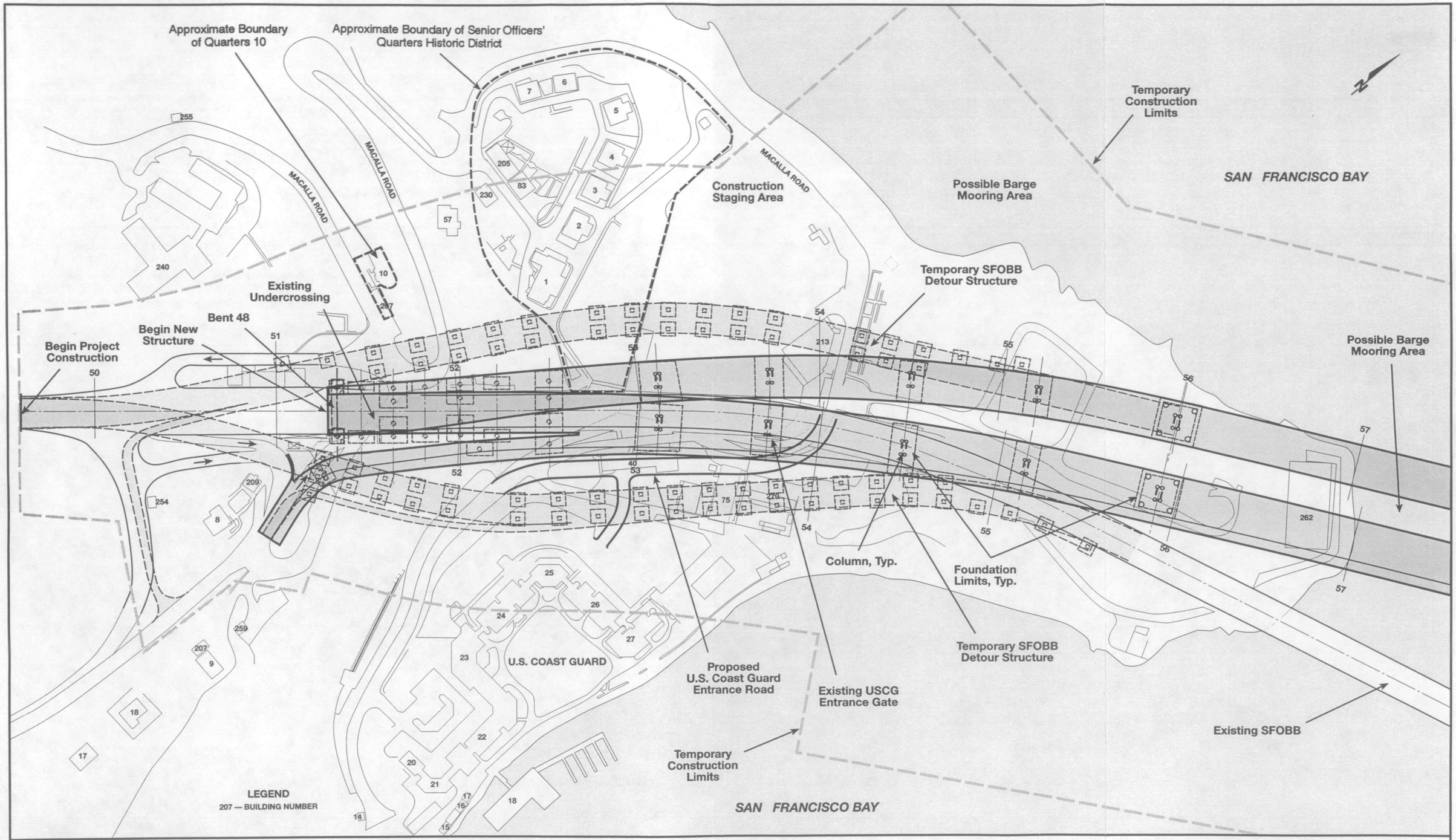
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,000
0 25 50 100 m

Foundation Construction Impact
North Option Alternative N-6

Figure 2-17.1

PBQ&D F-106-N2-N 9/12/98

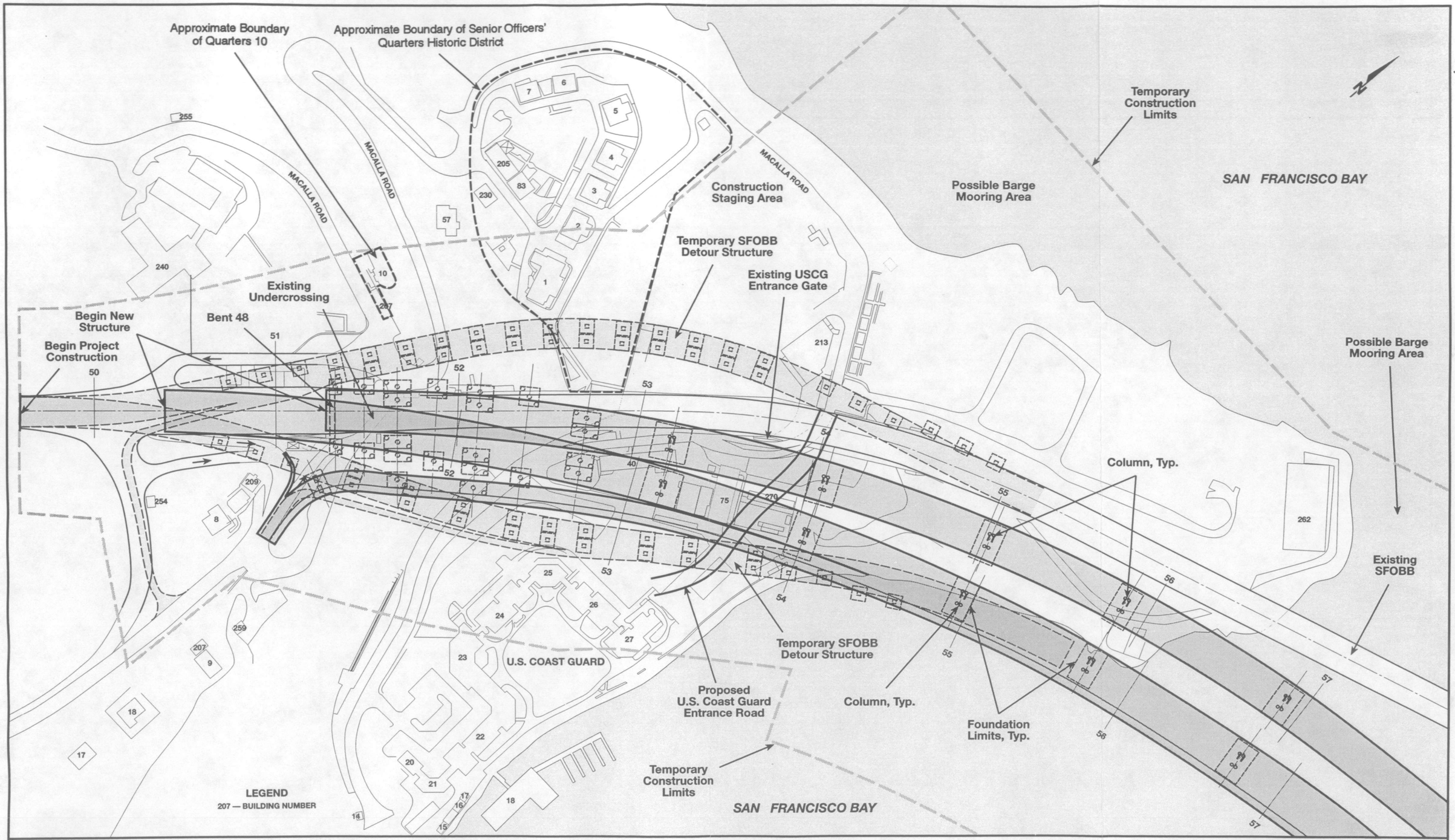


SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Foundation Construction Impact
North-South Option Alternative N-6

Figure 2-17.2

PBQ&D F-106-N6-N/S 9/12/98



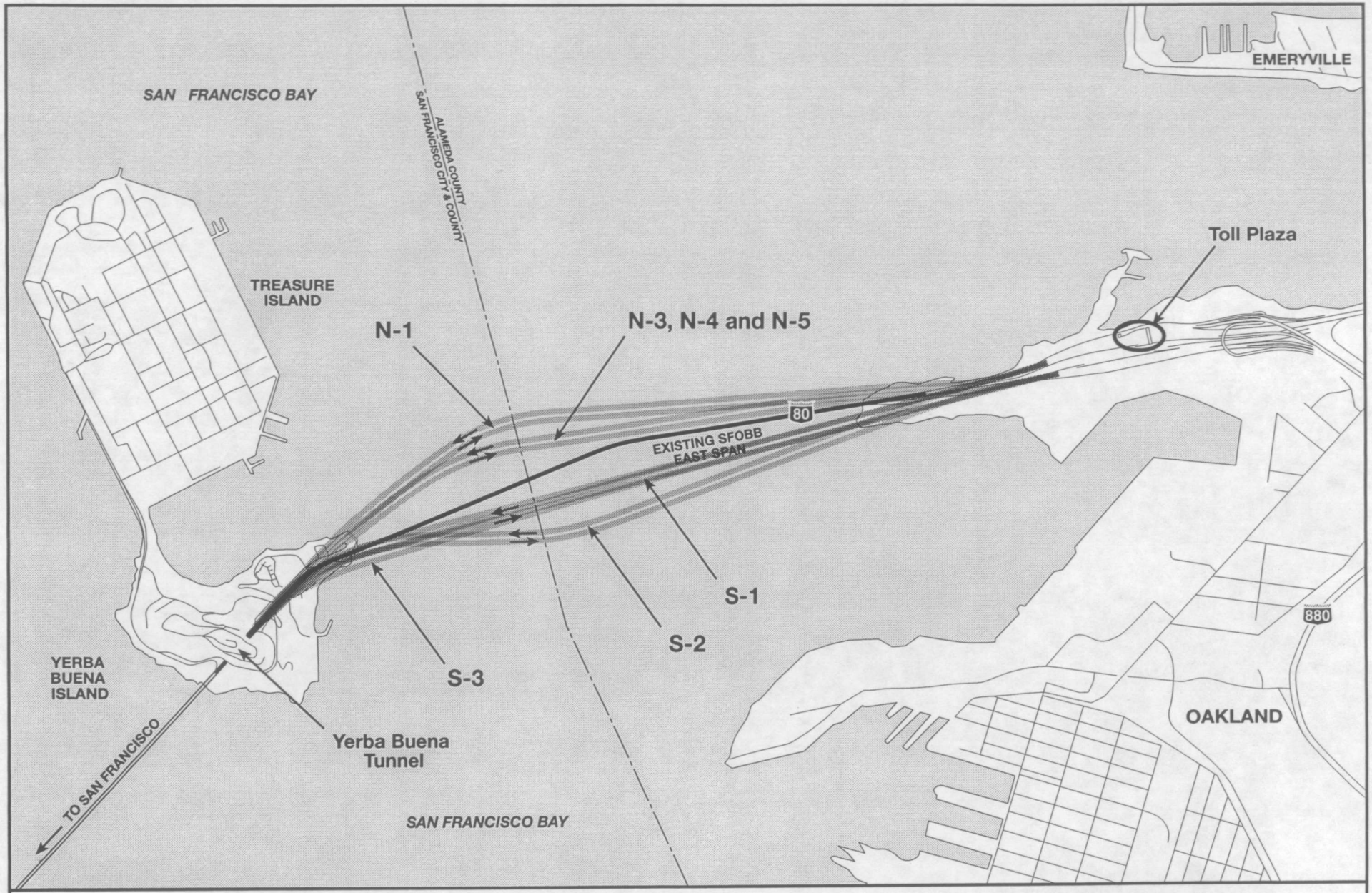
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,000
0 25 50 100 m

Foundation Construction Impact
North-South Option Alternative S-4

Figure 2-18

PBQ&D F-S2-N/S 9/12/98



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

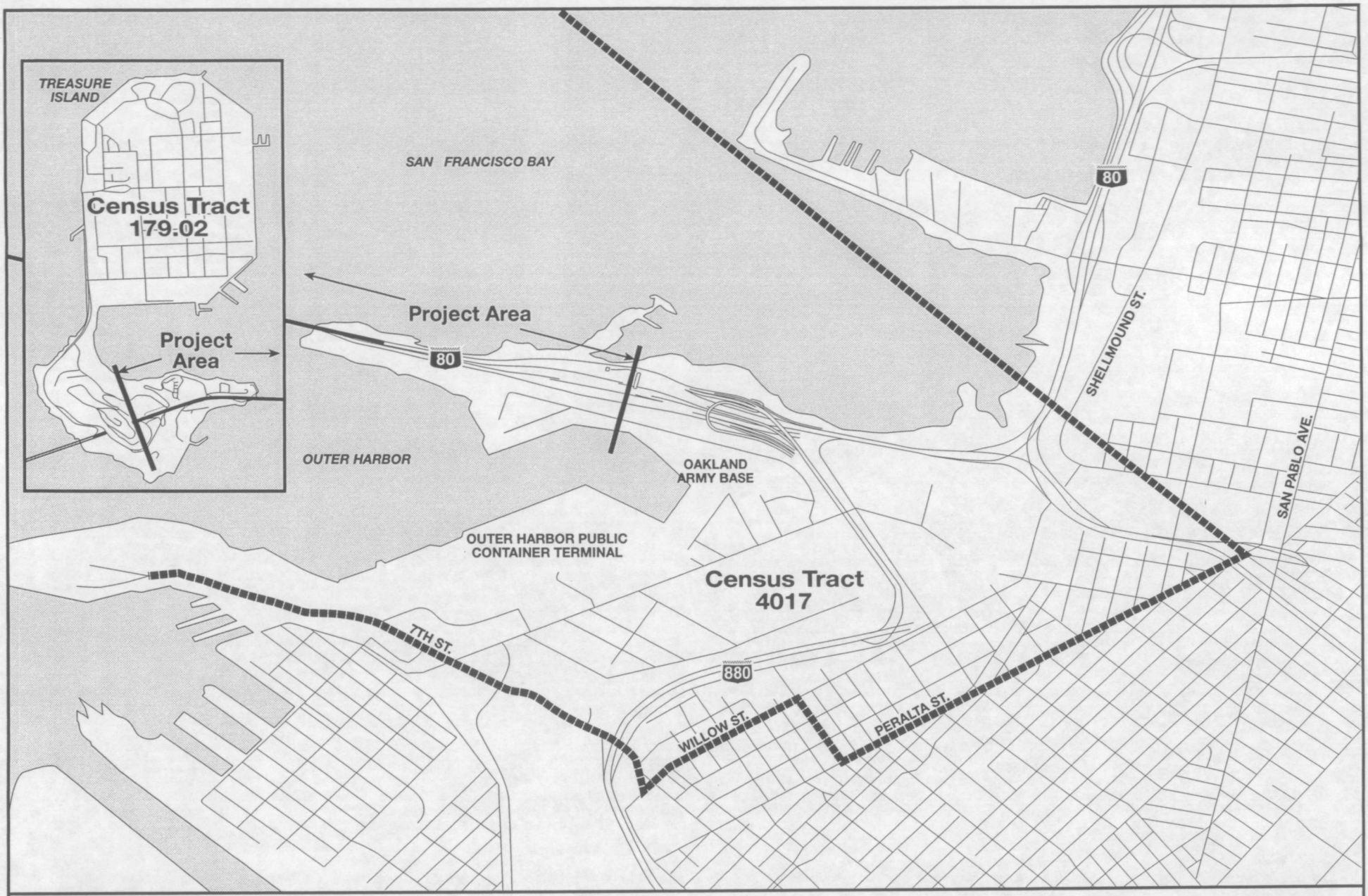
GRAPHIC SCALE 1:27,500

0 250 500 1000 m

Project Alignment Alternatives Considered and Withdrawn

Figure 2-19

PBQ&D F-231R 9/8/98



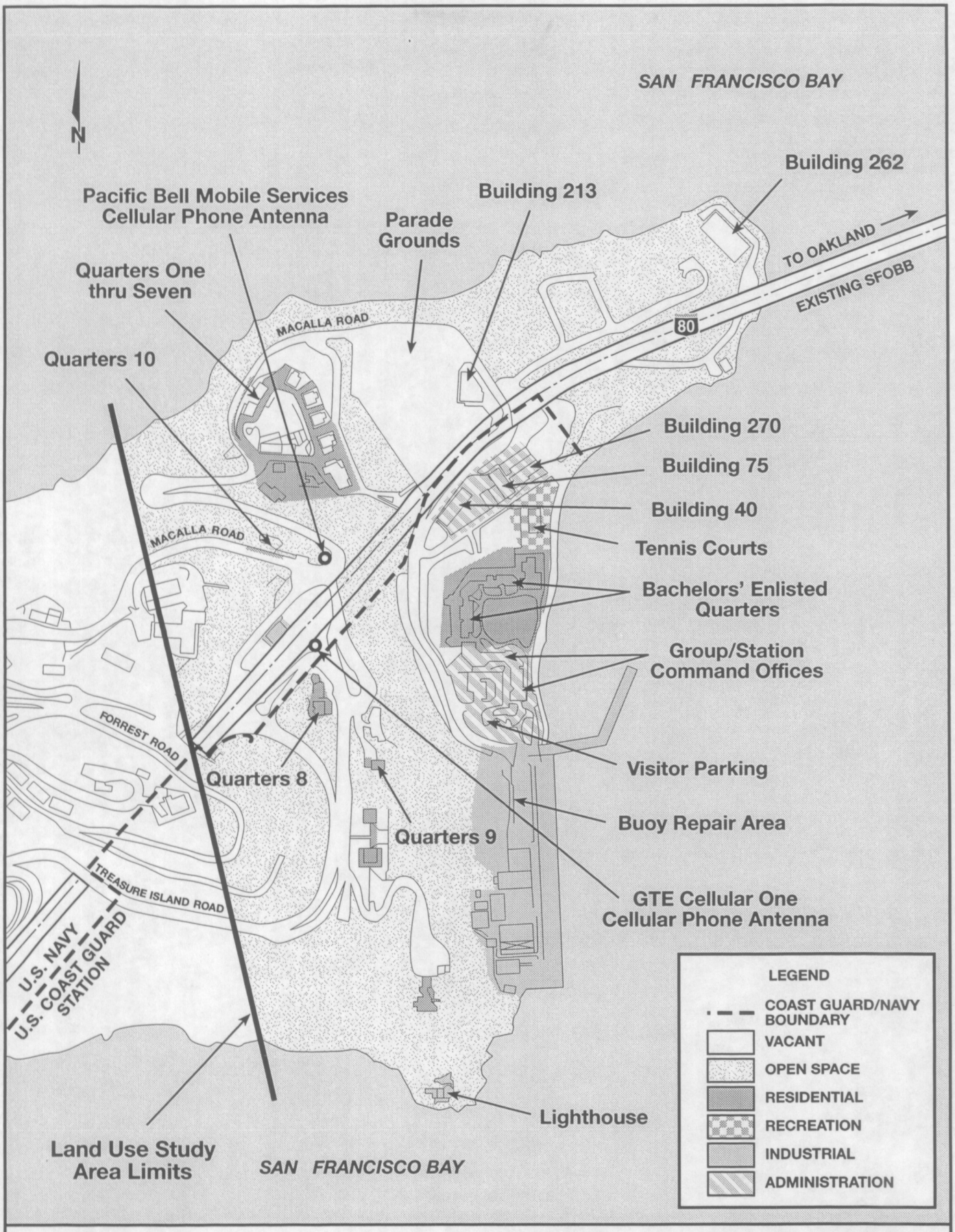
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

NO SCALE

San Francisco-Oakland Census Tracts

Figure 3-1

PBQ&D F-233 9/8/98



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

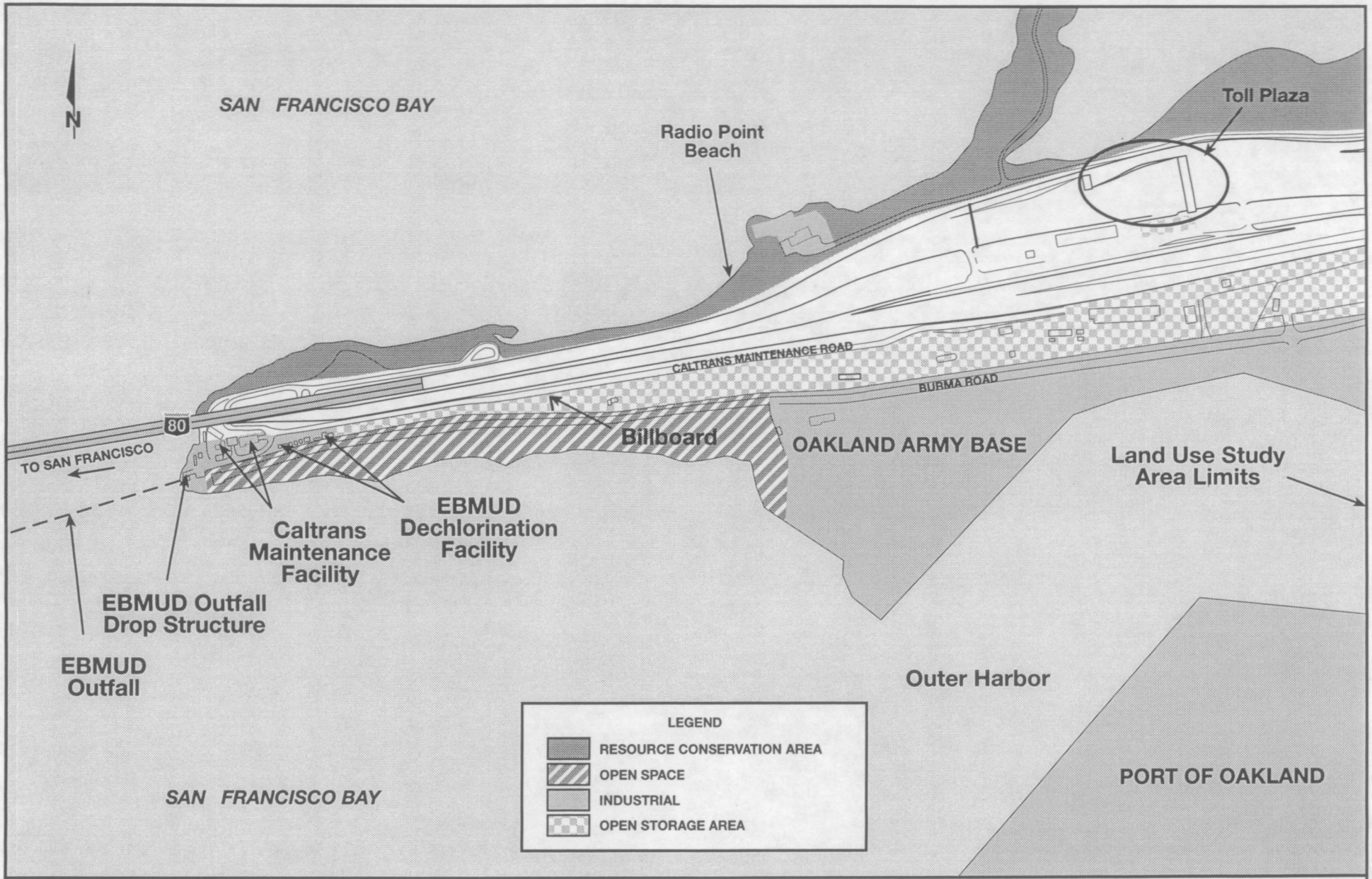
GRAPHIC SCALE 1:5,000

0 100 200 300 m

Existing Land Uses Yerba Buena Island

Figure 3-2

PBQ&D F-104 9/12/98

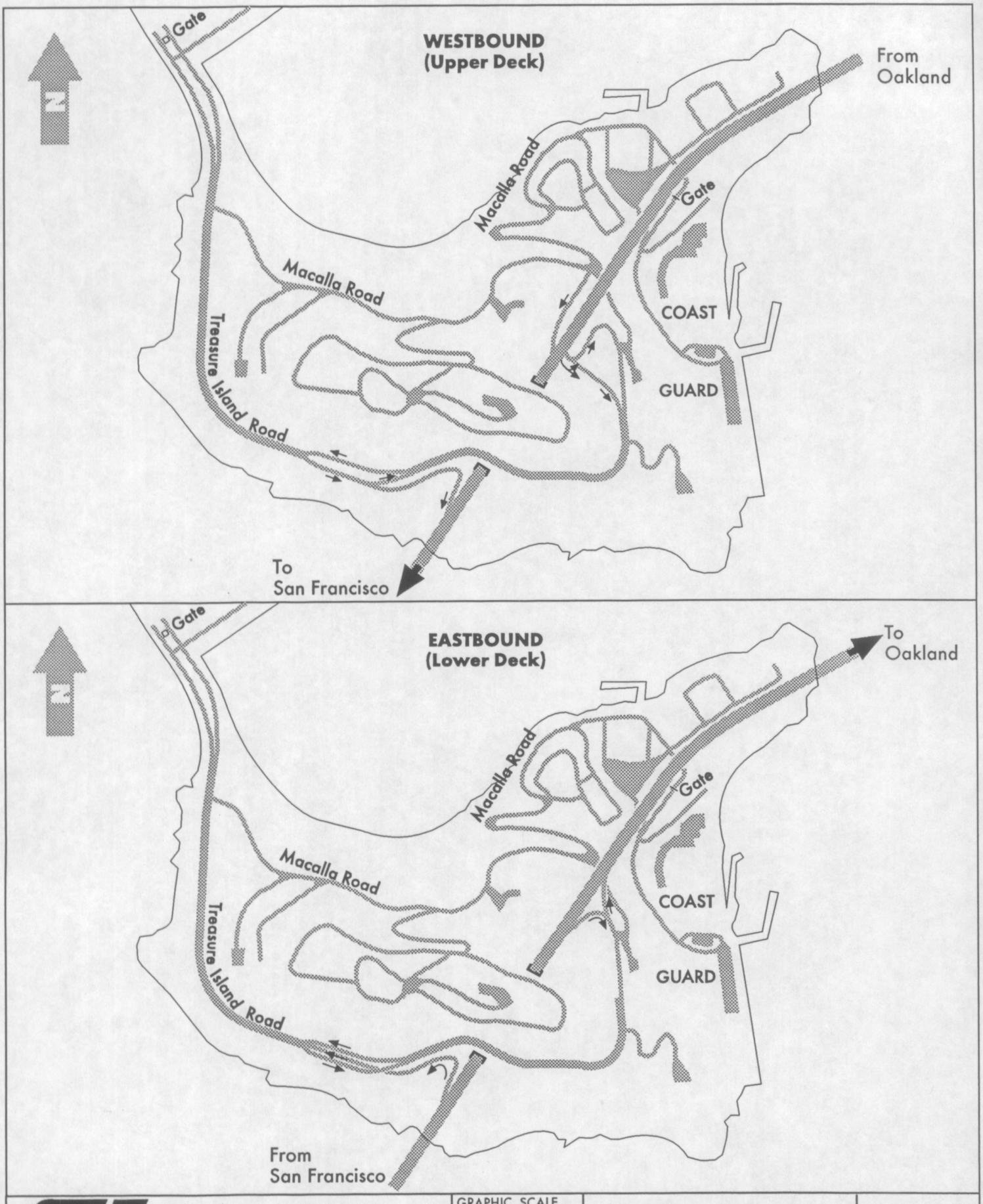


SFOBB EAST SPAN SEISMIC SAFETY PROJECT

GRAPHIC SCALE 1:8,000
0 50 100 200 m

Existing Land Uses
Oakland Touchdown Area
Figure 3-3

PDQ&D F-103 9/8/98

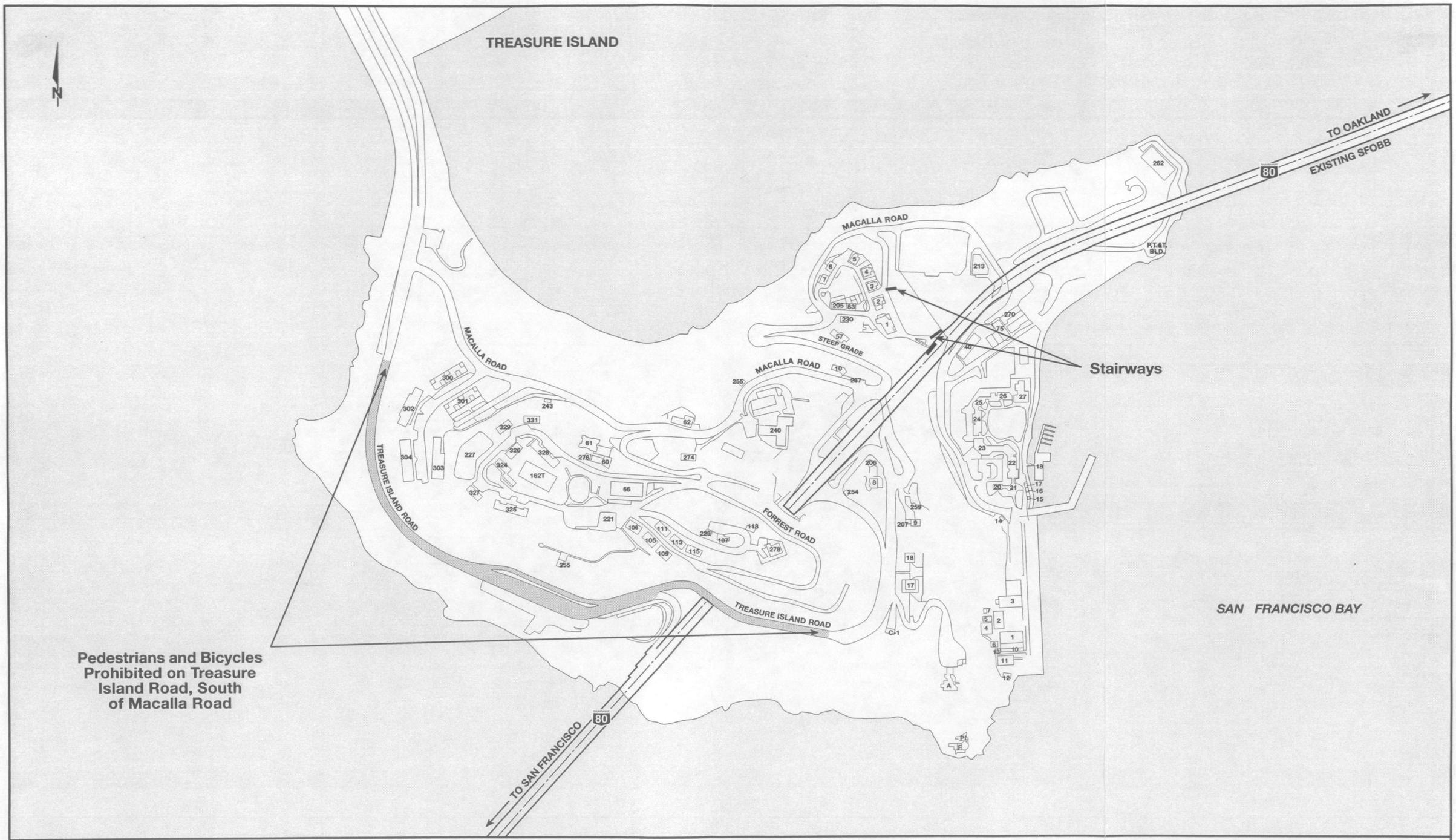


SFOBB EAST SPAN SEISMIC SAFETY PROJECT

GRAPHIC SCALE
0 100m 200m

Yerba Buena Island
Existing SFOBB Ramps

FIGURE 3-4



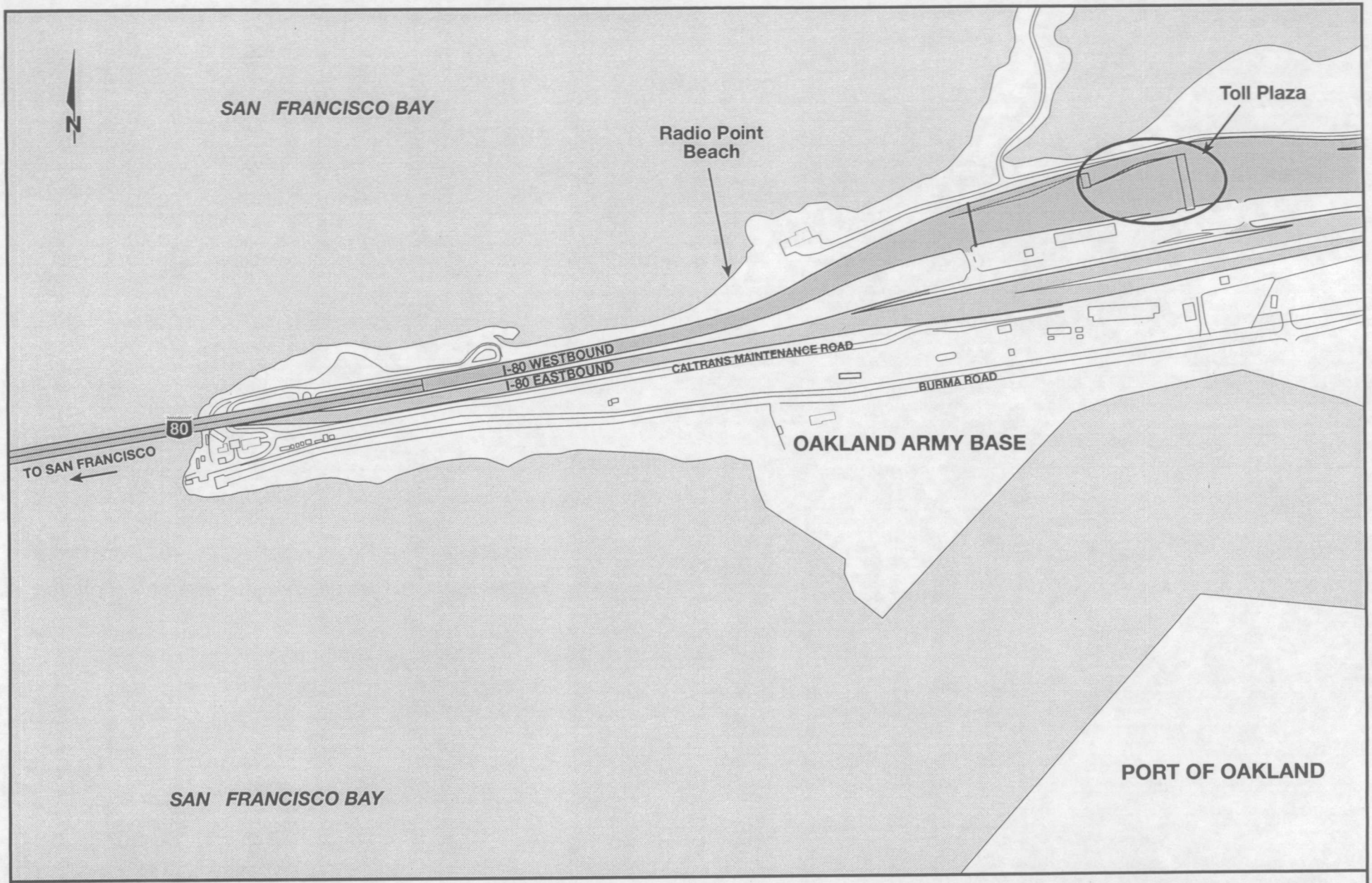
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:5,000
0 100 200 300 m

Existing Streets and Pedestrian Facilities Yerba Buena Island

Figure 3-5

PBQ&D F-102 9/8/98



SFOBB EAST SPAN SEISMIC SAFETY PROJECT

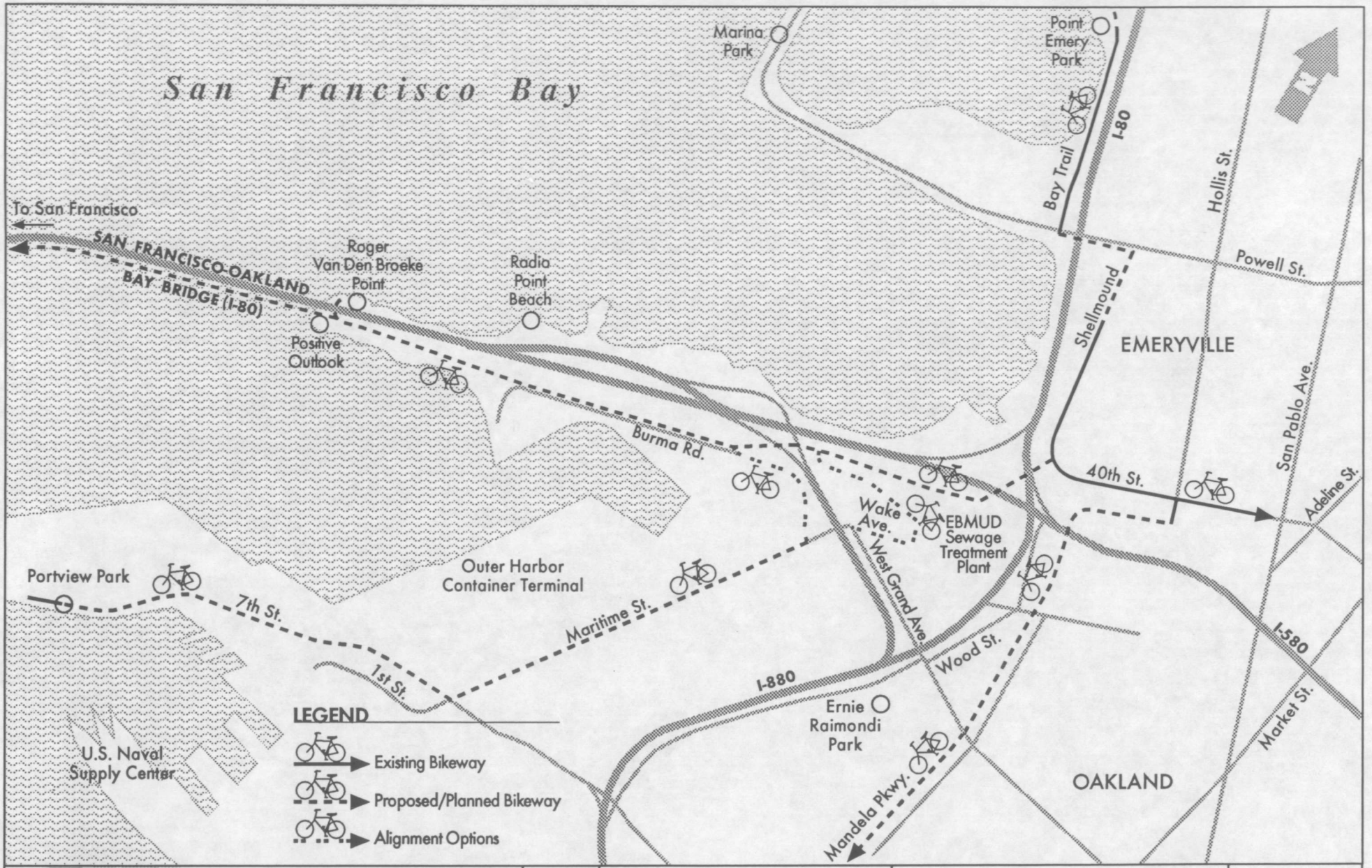
GRAPHIC SCALE 1:8,000

0 50 100 200 m

Existing Streets and Pedestrian Facilities
Oakland Touchdown Area

Figure 3-6

PDQ&D F-219 910/98



SFOBB EAST SPAN SEISMIC SAFETY PROJECT

Bay Trail & Bikeways

FIGURE 3-7

Source: Parsons Brinckerhoff Quade & Douglas, Inc.

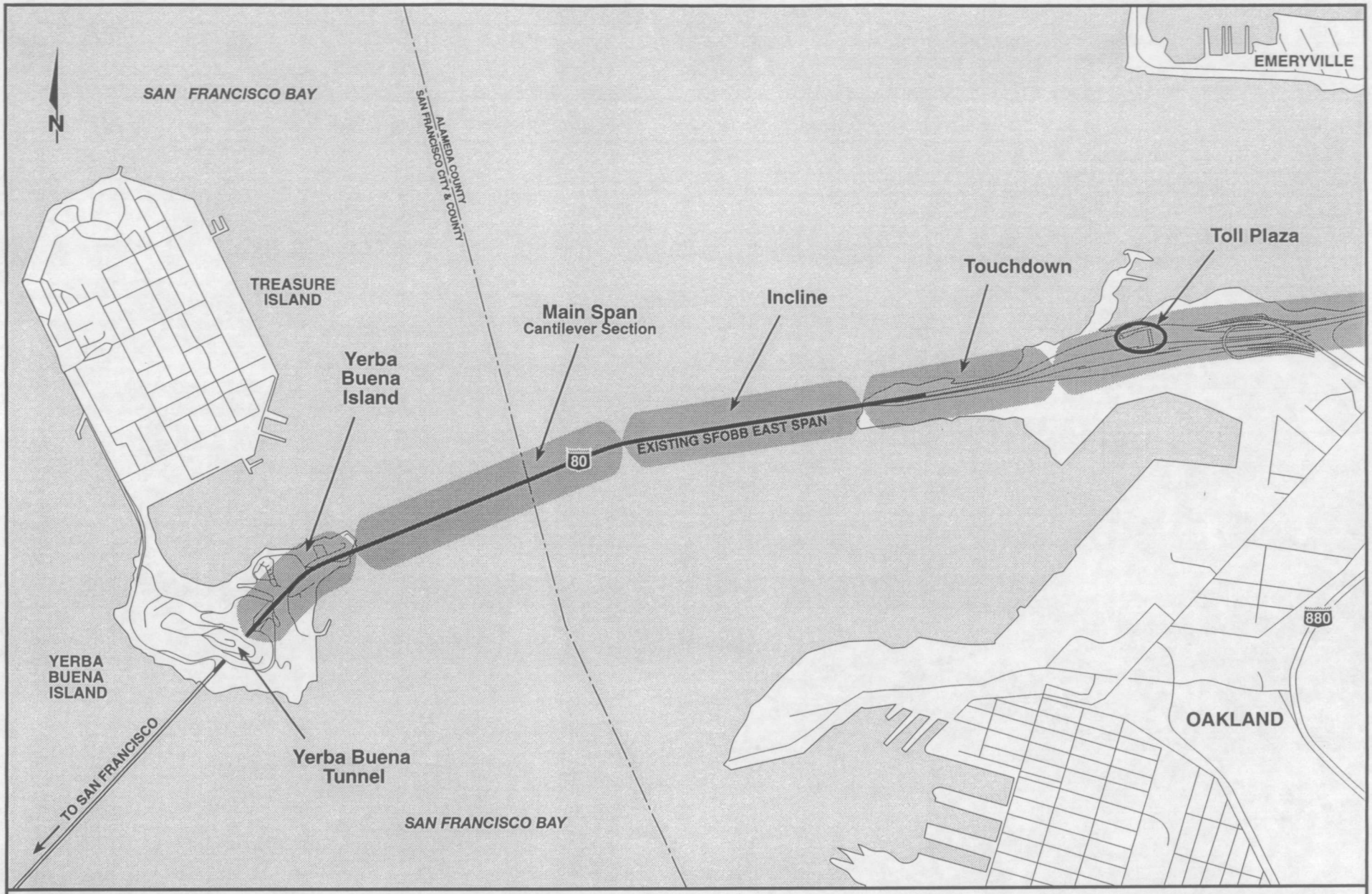
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Source: Caltrans, August 1998

Visual Context

Figure 3-8

PBQ&D F-VC 9/16/98



SFOBB EAST SPAN SEISMIC SAFETY PROJECT

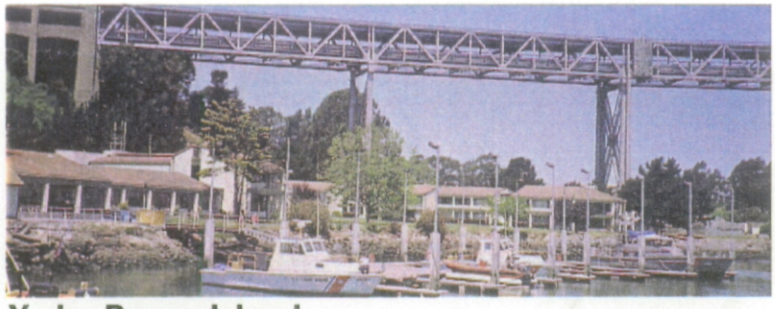
GRAPHIC SCALE 1:27,500

0 250 500 1000 m

Location of Landscape Units

Figure 3-9

PBQ&D F-231 9/10/98



Yerba Buena Island

Main Span (cantilever section)

Incline

Oakland Touchdown Area

Toll Plaza

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

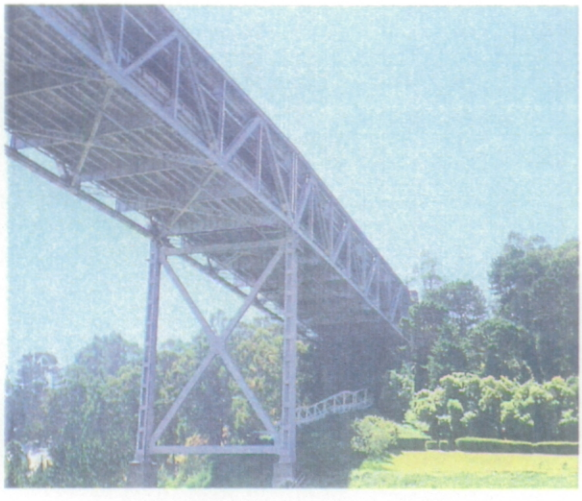
Landscape Units

Figure 3.10.1

R1—Older Residential

01—Marsh/Estuary

R2—High Density Residential



02—Woodland

H1—Historic Structures

03—The Bay

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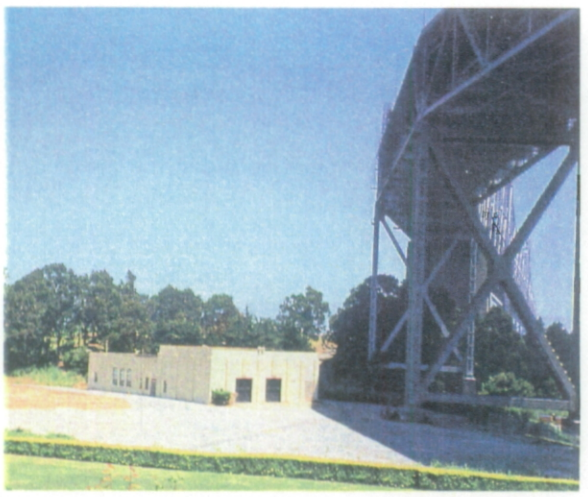
SEISMIC SAFETY
PROJECT

Image Types

Figure 3.10.2

M1—US Army

I1—Light Industrial



M2—US Navy

I2—Port Facilities

M3—Toll Plaza

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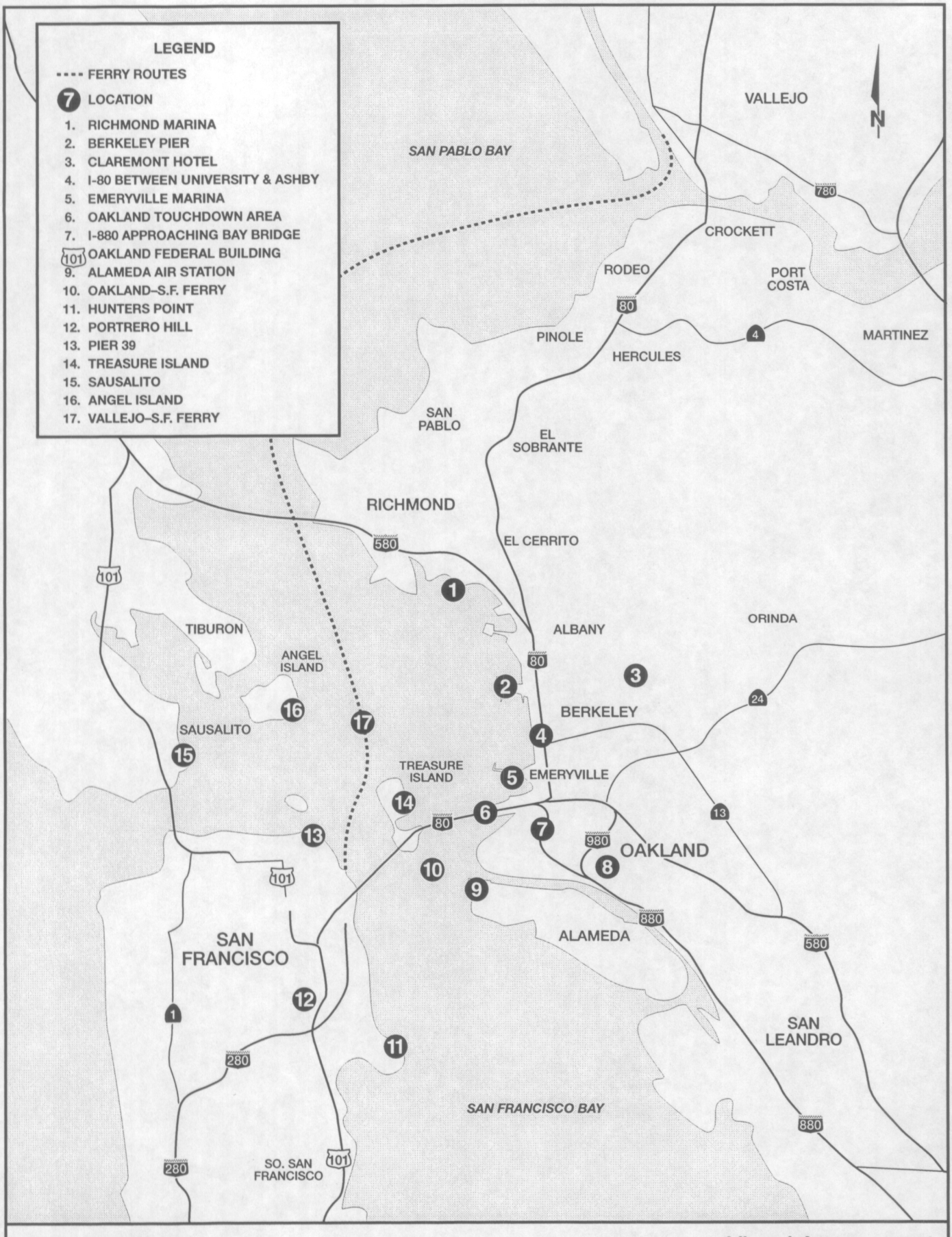
SEISMIC SAFETY
PROJECT

Image Types

Figure 3.10.3



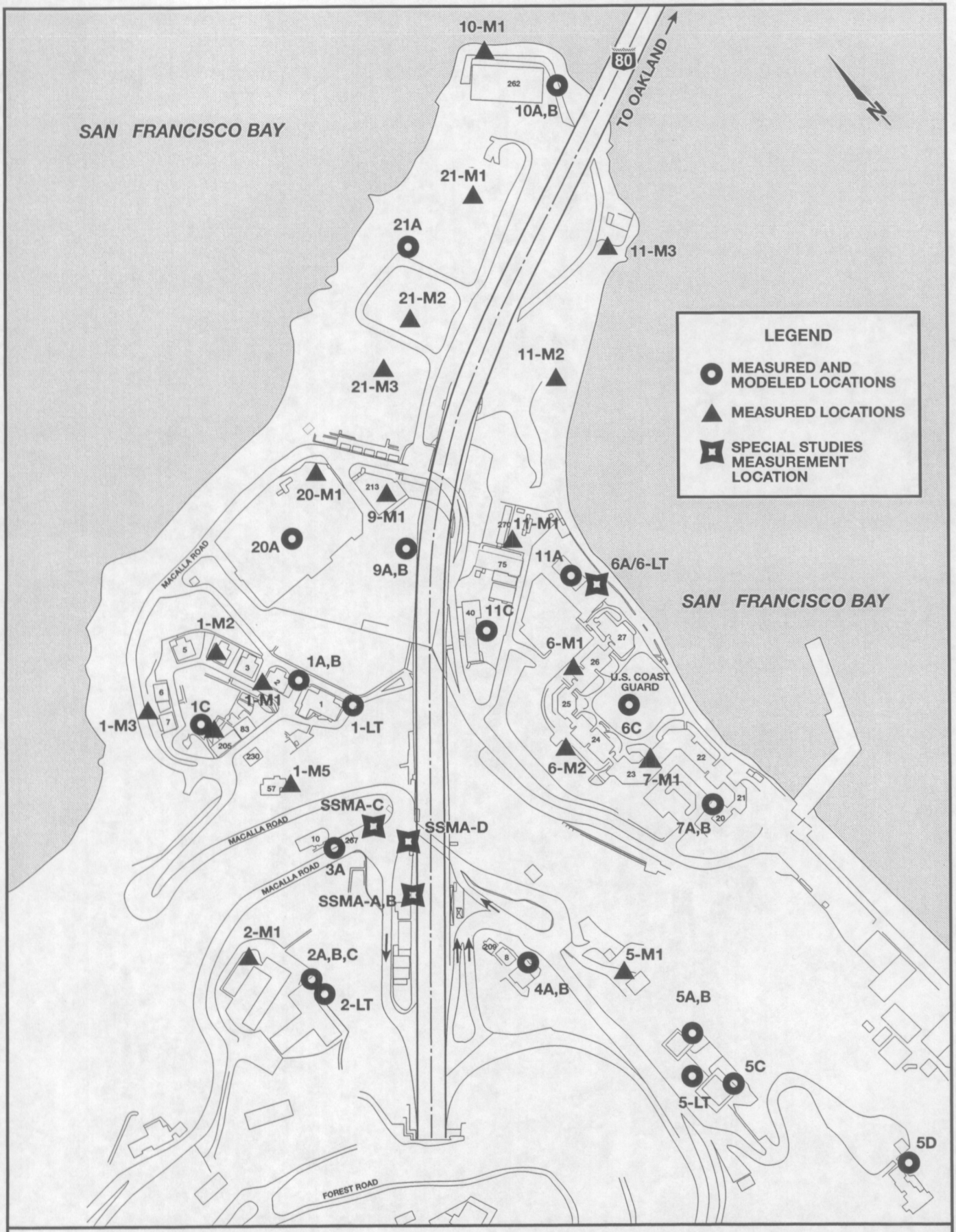
SFOBB EAST SPAN SEISMIC SAFETY PROJECT

NO SCALE

Visual Assessment Viewpoint Locations

Figure 3-11

PBQ&D F-V 9/10/98

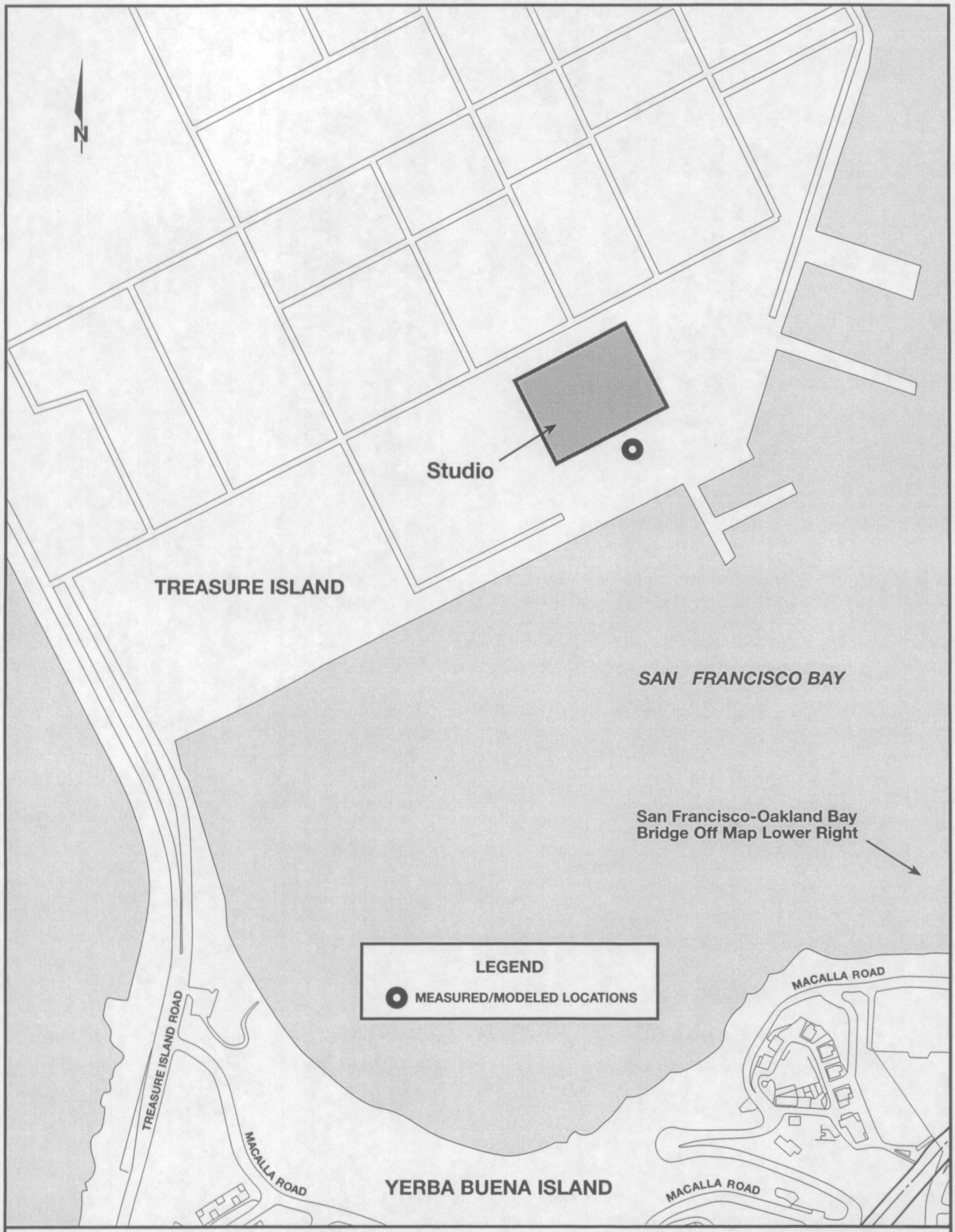


SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:3,500
0 25 50 m

Noise Measurement and Modeling Locations–Yerba Buena Island

Figure 3-12



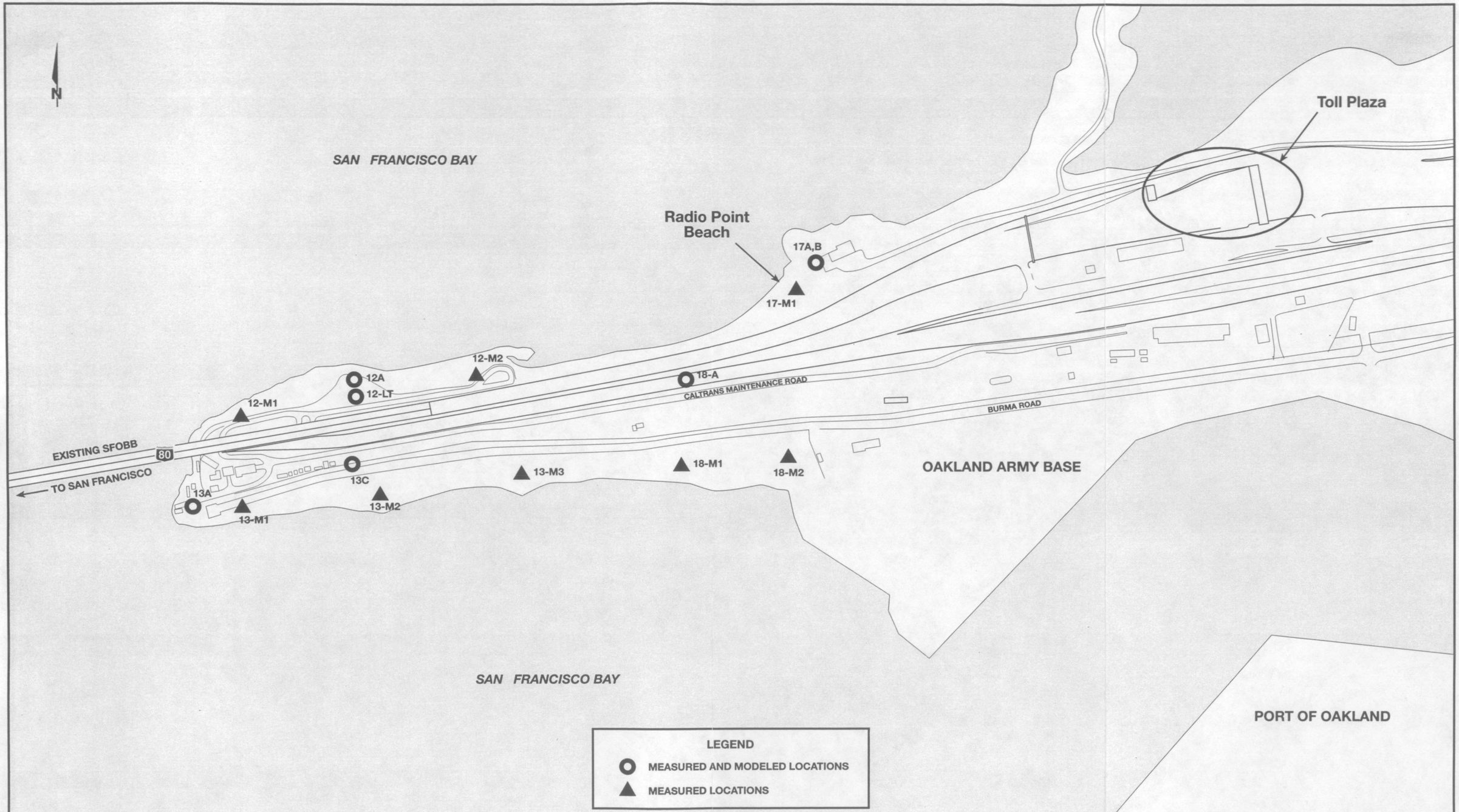
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:5,000

0 100 200 m

Noise Measurement and Modeling Locations – Treasure Island

Figure 3-13

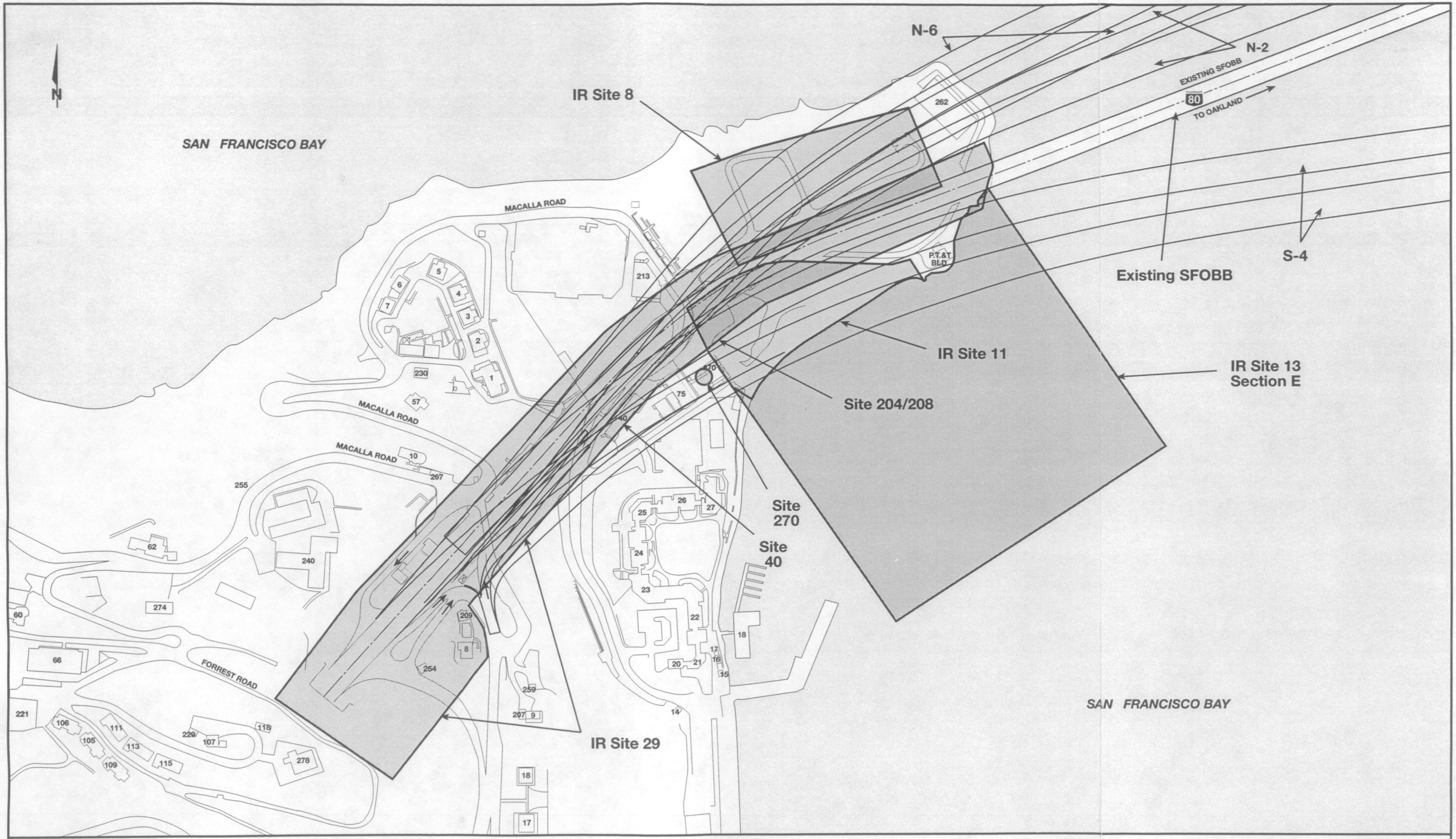


SFOBB EAST SPAN SEISMIC SAFETY PROJECT

Noise Measurement and Modeling Locations–Oakland Touchdown Area

Figure 3-14

PDQ&D F-227 9/8/98

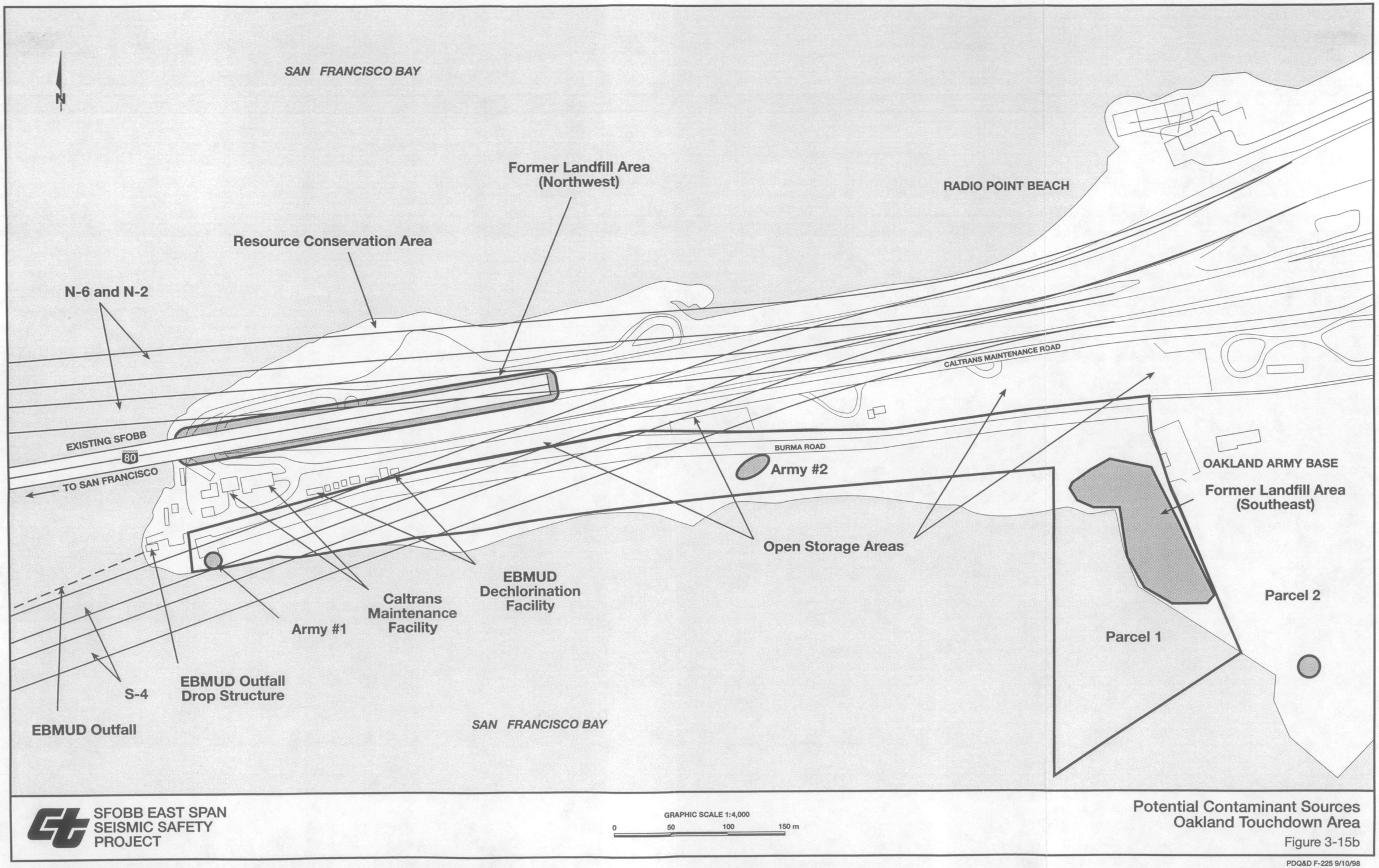


SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Potential Contaminant Sources
Yerba Buena Island

Figure 3-15a

PDQ&D F-224(200) 9/10/98



SFOBB EAST SPAN SEISMIC SAFETY PROJECT

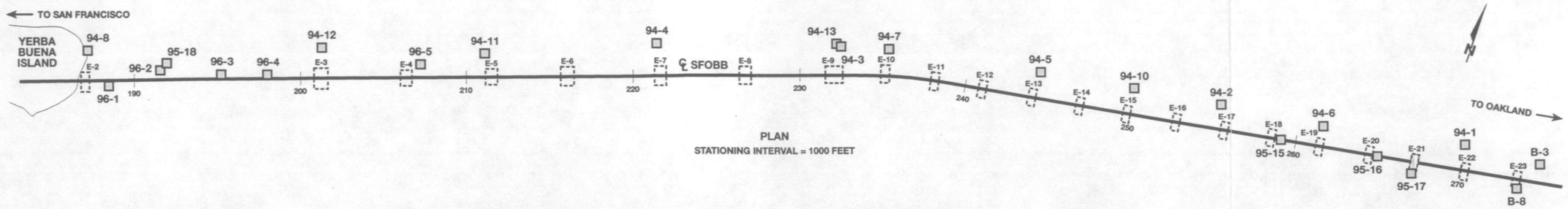
GRAPHIC SCALE 1:4,000

0 50 100 150 m

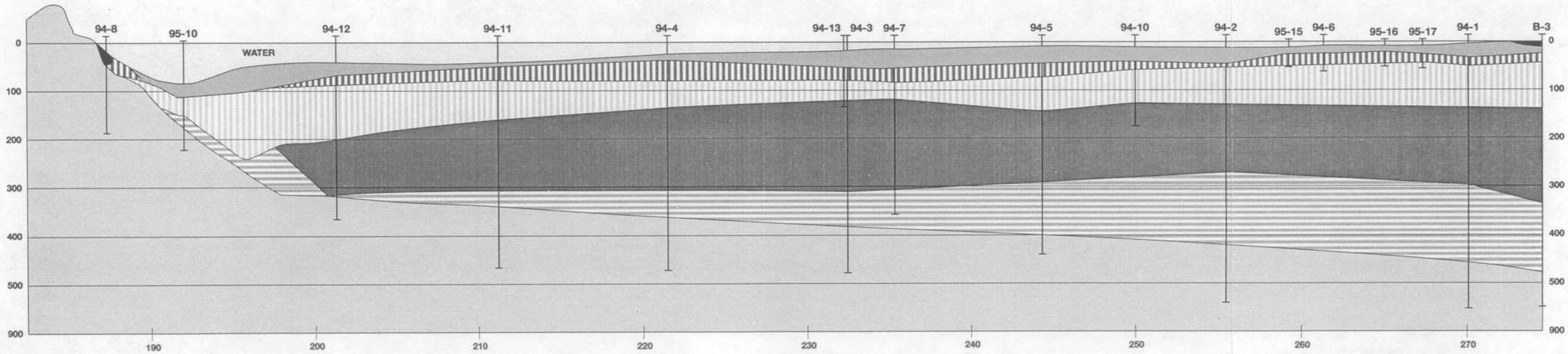
Potential Contaminant Sources
Oakland Touchdown Area

Figure 3-15b

PDQ&D F-225 9/10/98



PLAN
STATIONING INTERVAL = 1000 FEET



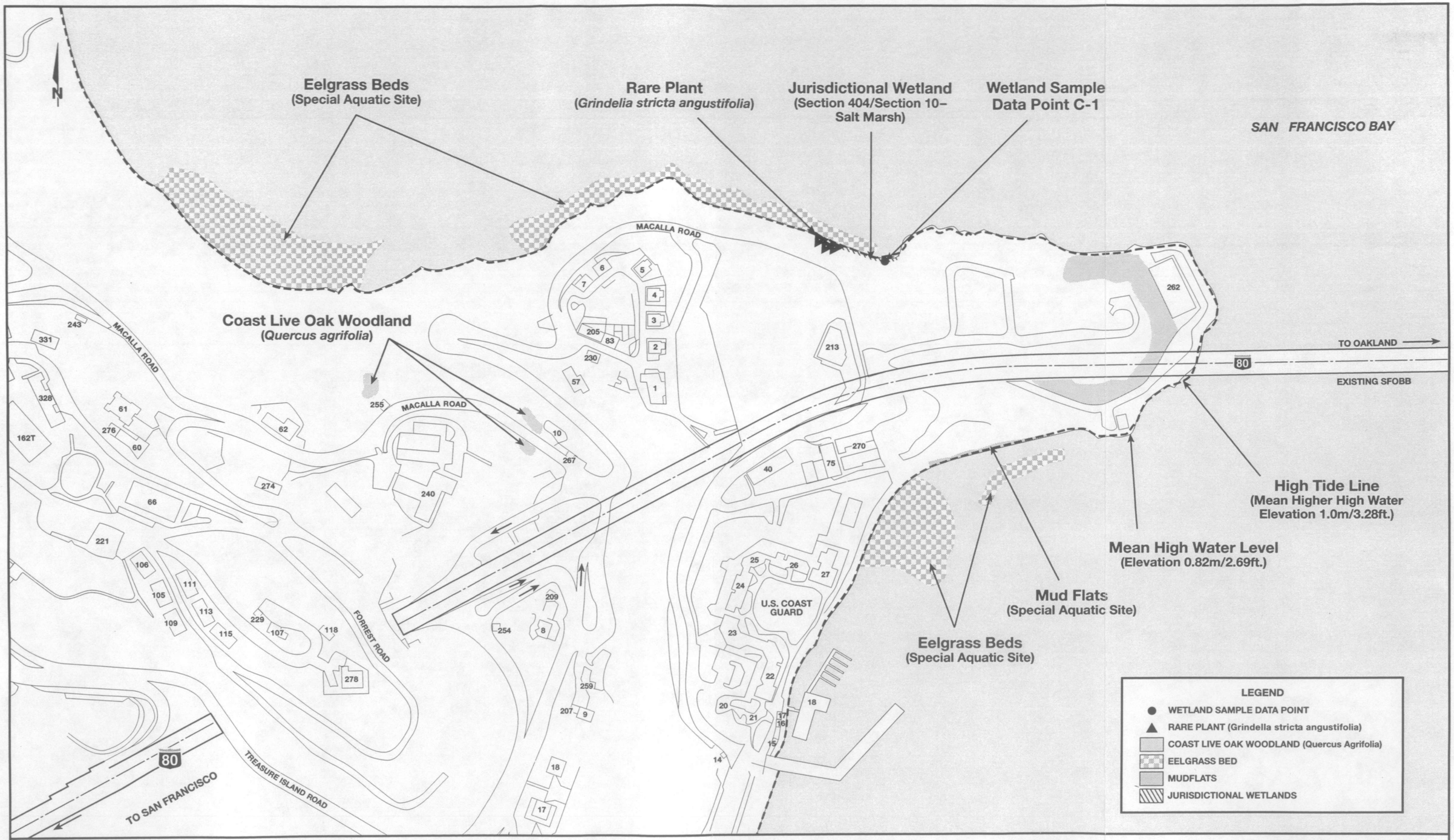
PROFILE
STATIONING INTERVAL = 1000 FEET
VERTICAL EXAGGERATION = 3
ELEVATIONS REFER TO THE MEAN LOWER LOW WATER DATUM OF 1933 (MLLW)

LEGEND
- SEDIMENT SAMPLING LOCATION
- FILL
- YOUNG BAY MUD
- MERRITT/POSEY/SAN ANTONIO FORMATION
- YERBA BUENA MUD (OLD BAY MUD)
- UPPER ALAMEDA FORMATION
- LOWER ALAMEDA FORMATION
- FRANCISCAN BEDROCK

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Geologic Profile of the Project Area

Figure 3-16



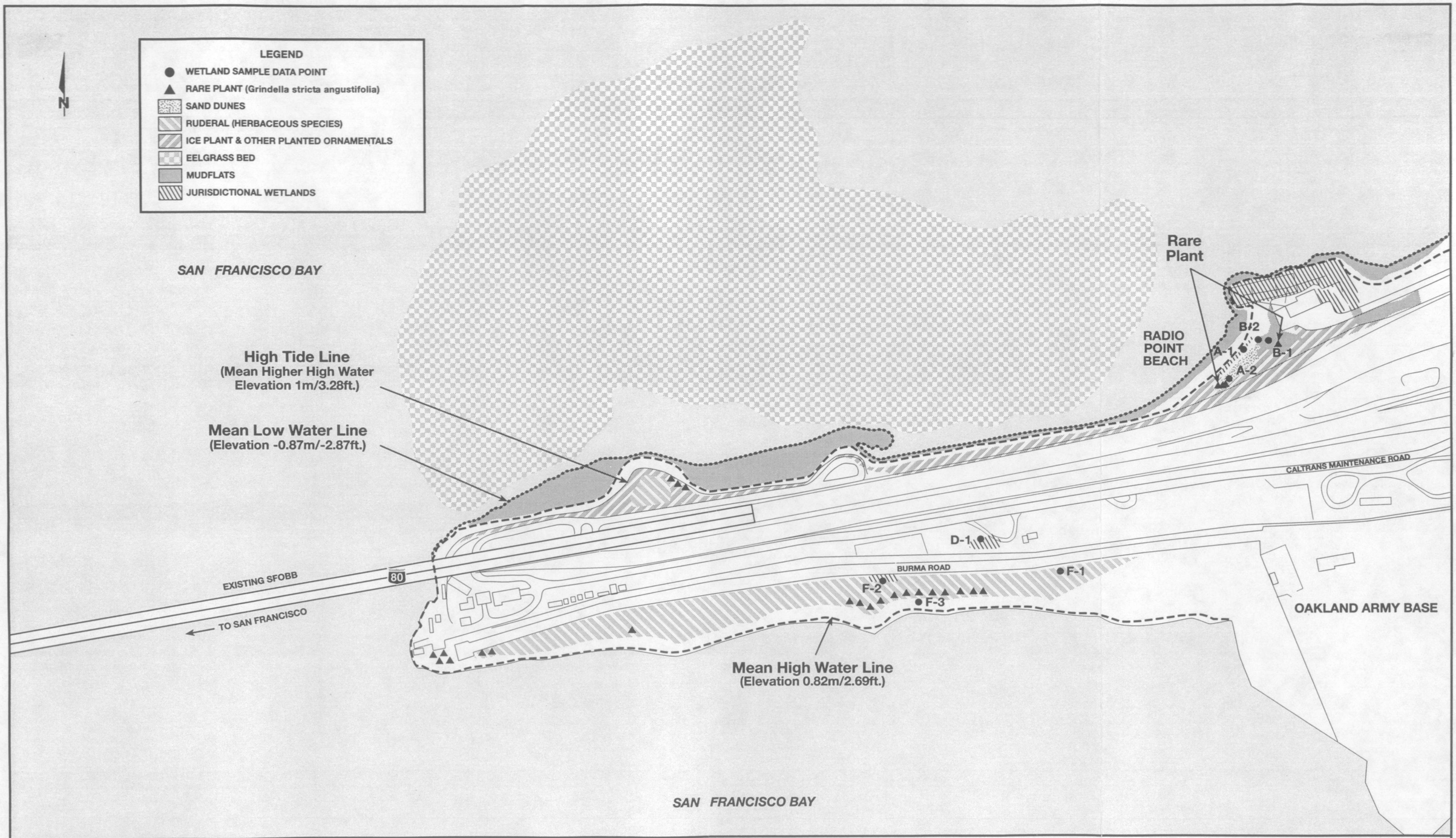
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:3,000
0 100 200 300 m

Biological Resources
Yerba Buena Island

Figure 3-17

PBQ&D F-BRYB 9/15/98

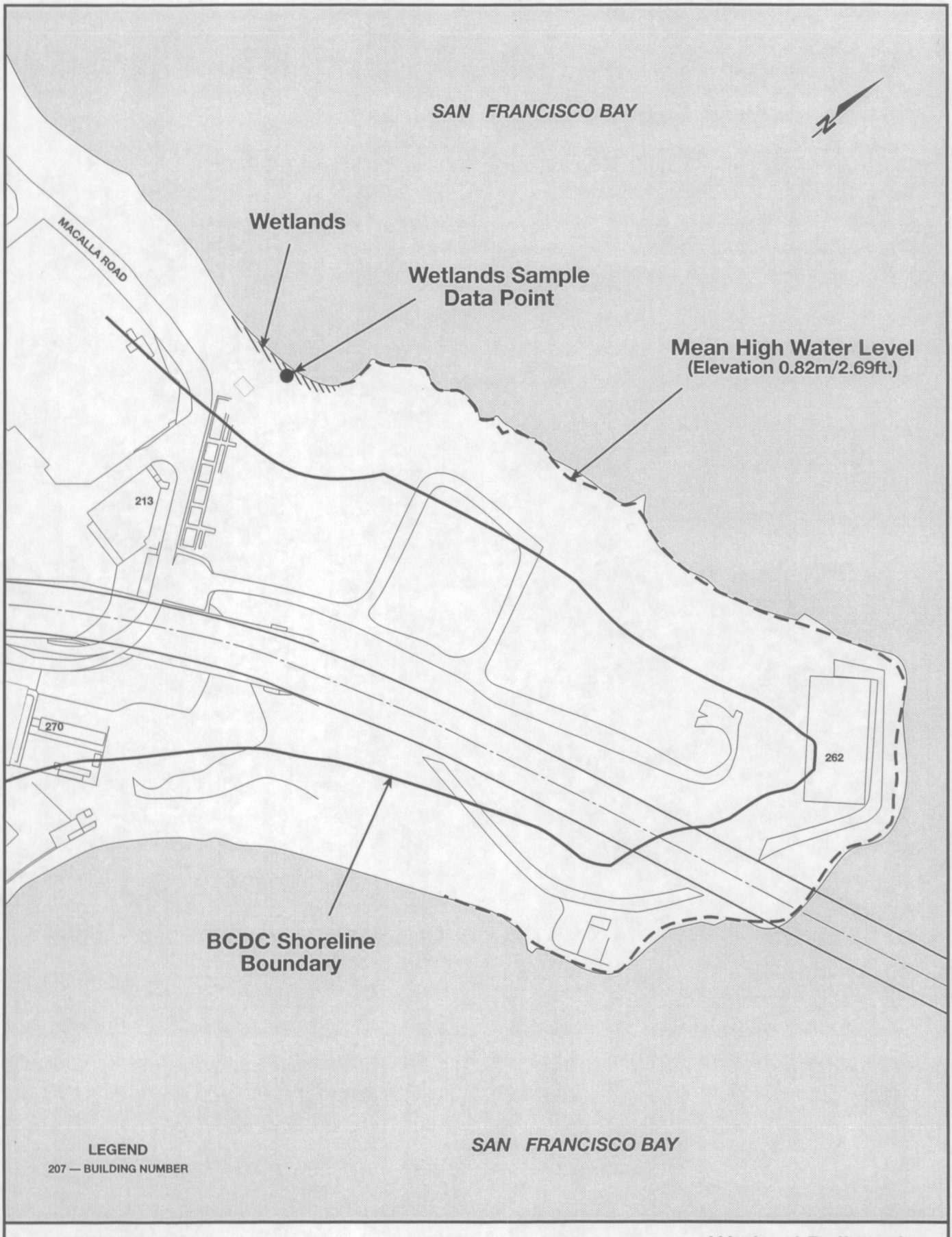


SFOBB EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:5,000
0 50 100 150 m

Biological Resources
Oakland Touchdown Area
Figure 3-18

PDQ&D BROAK 9/10/98



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

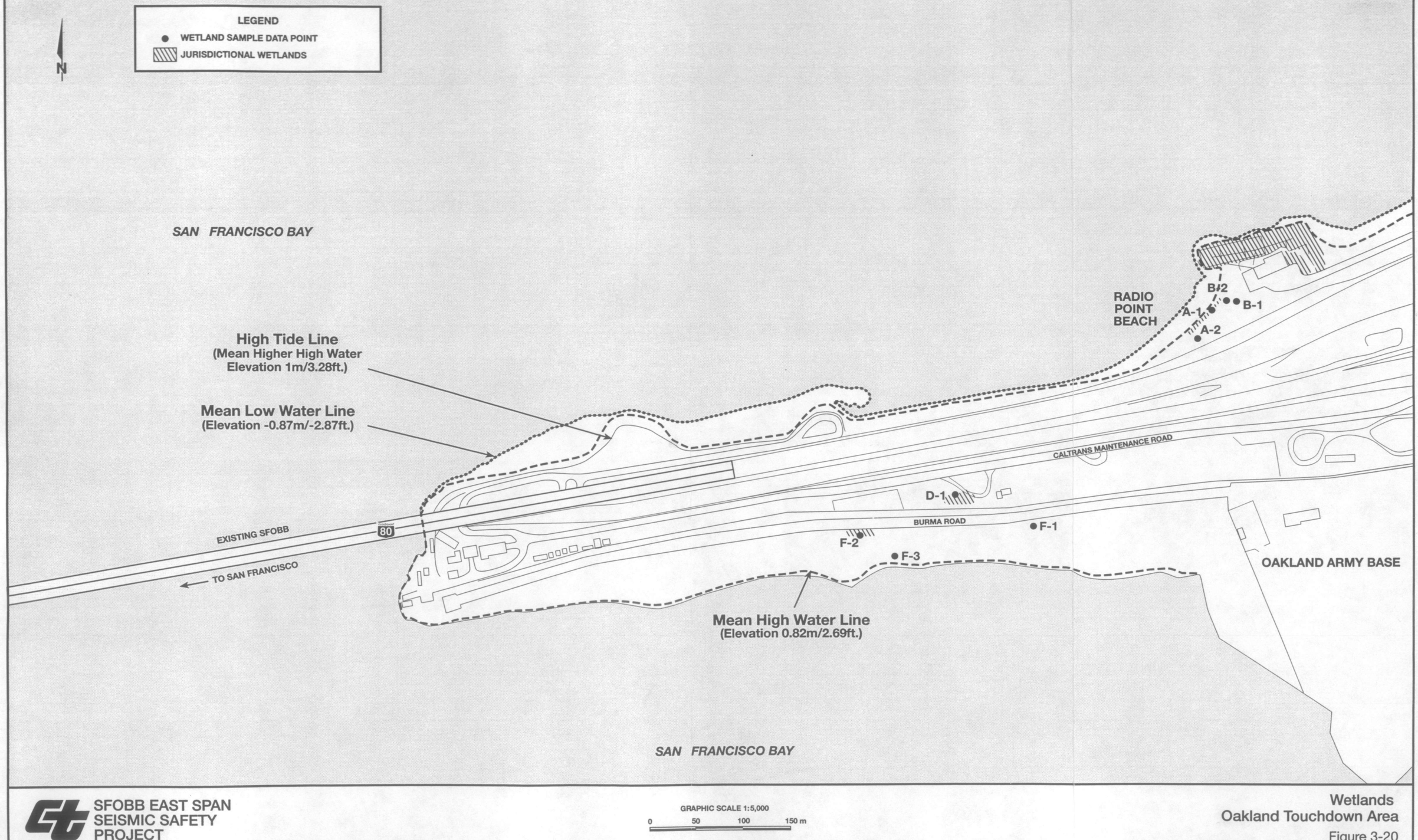
GRAPHIC SCALE 1:2,000

0 25 50 100 m

Wetland Delineation
Yerba Buena Island

Figure 3-19

PBQ&D F-WLD 9/10/98

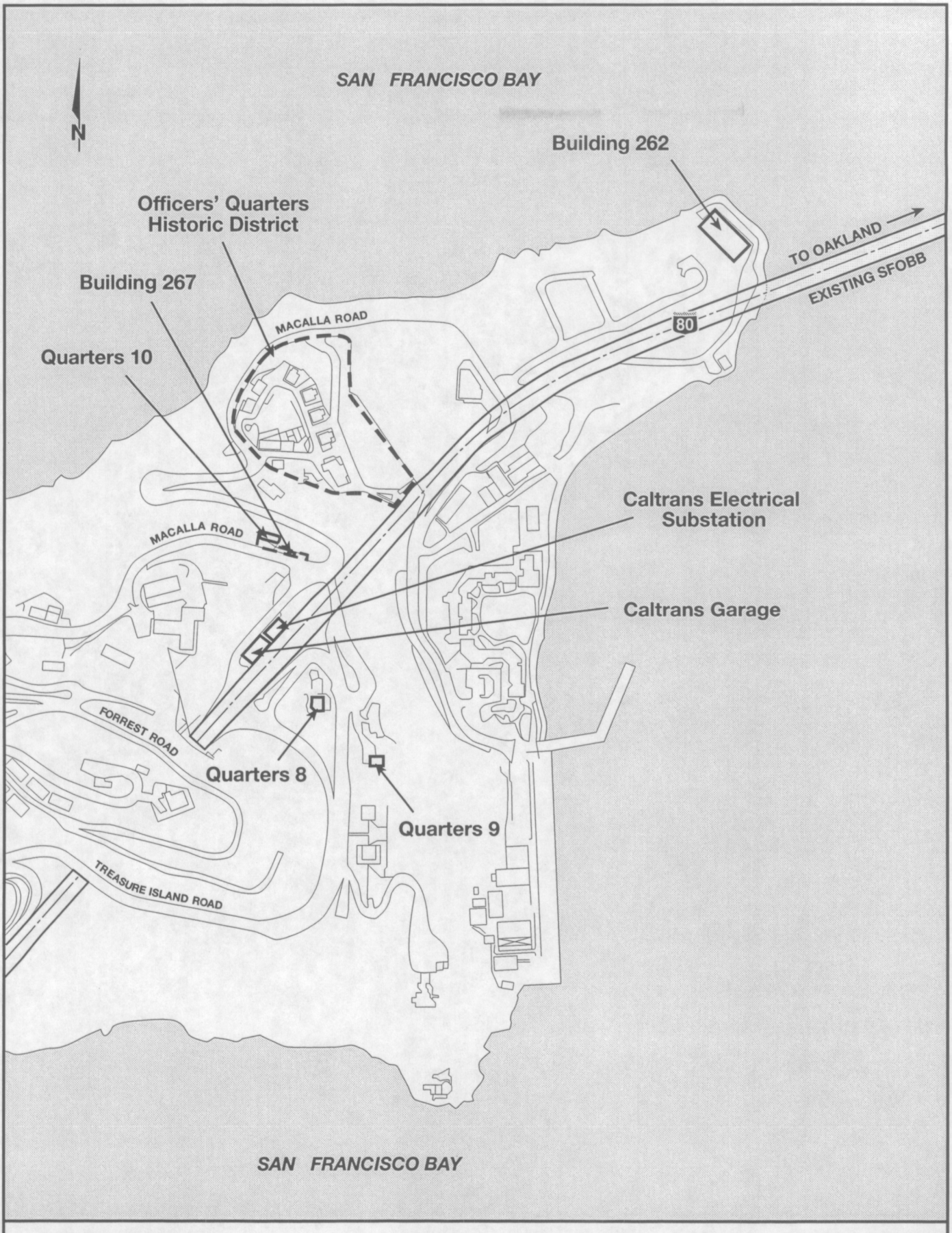


SFOBB EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:5,000
0 50 100 150 m

Wetlands
Oakland Touchdown Area
Figure 3-20

PDQ&D BROAK 9/10/98



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

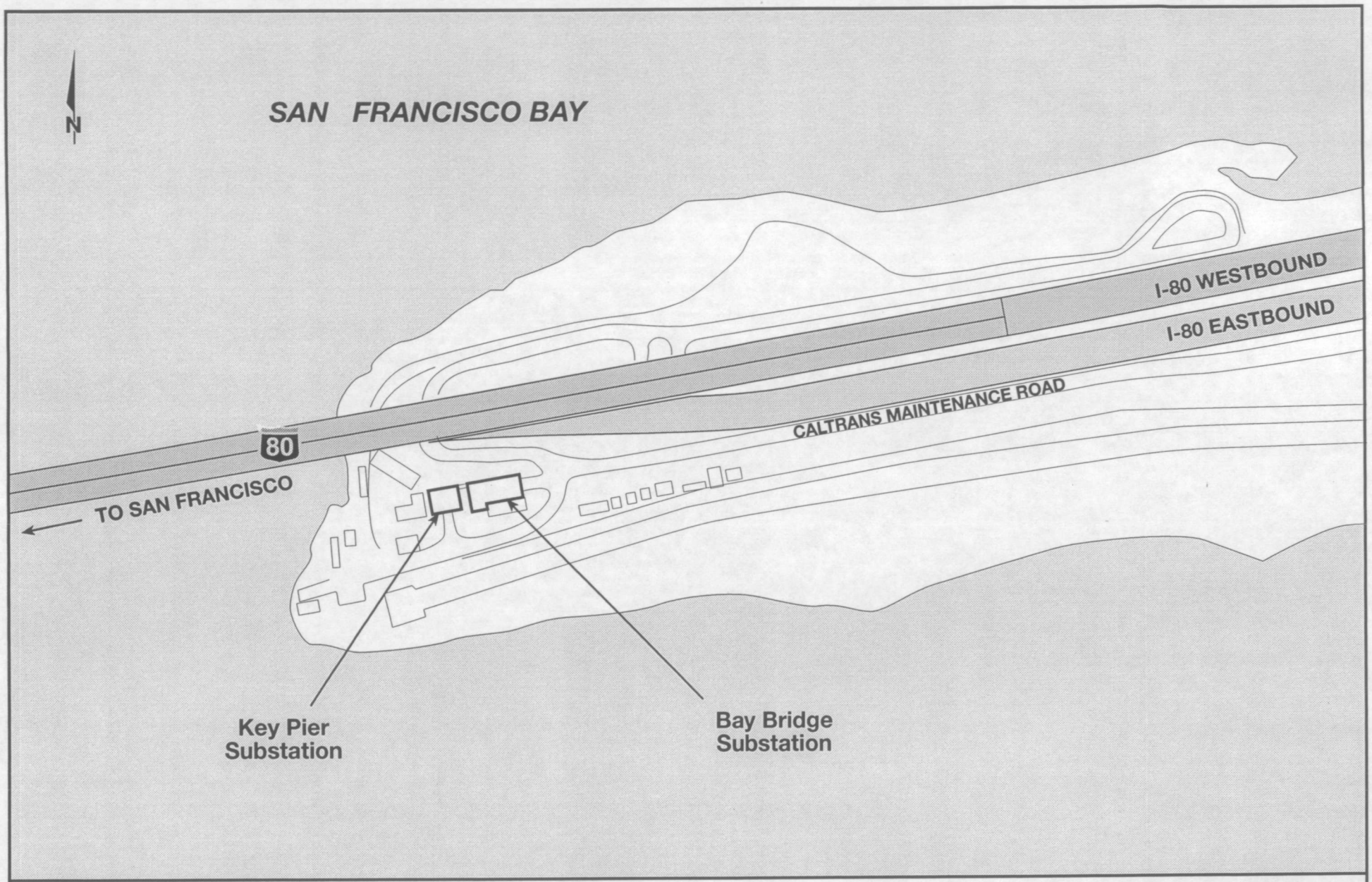
GRAPHIC SCALE 1:5,000

0 100 200m

Historic Resources
Yerba Buena Island

Figure 3-21

PBQ&D F-HYBI 9/17/98



SFOBB EAST SPAN SEISMIC SAFETY PROJECT

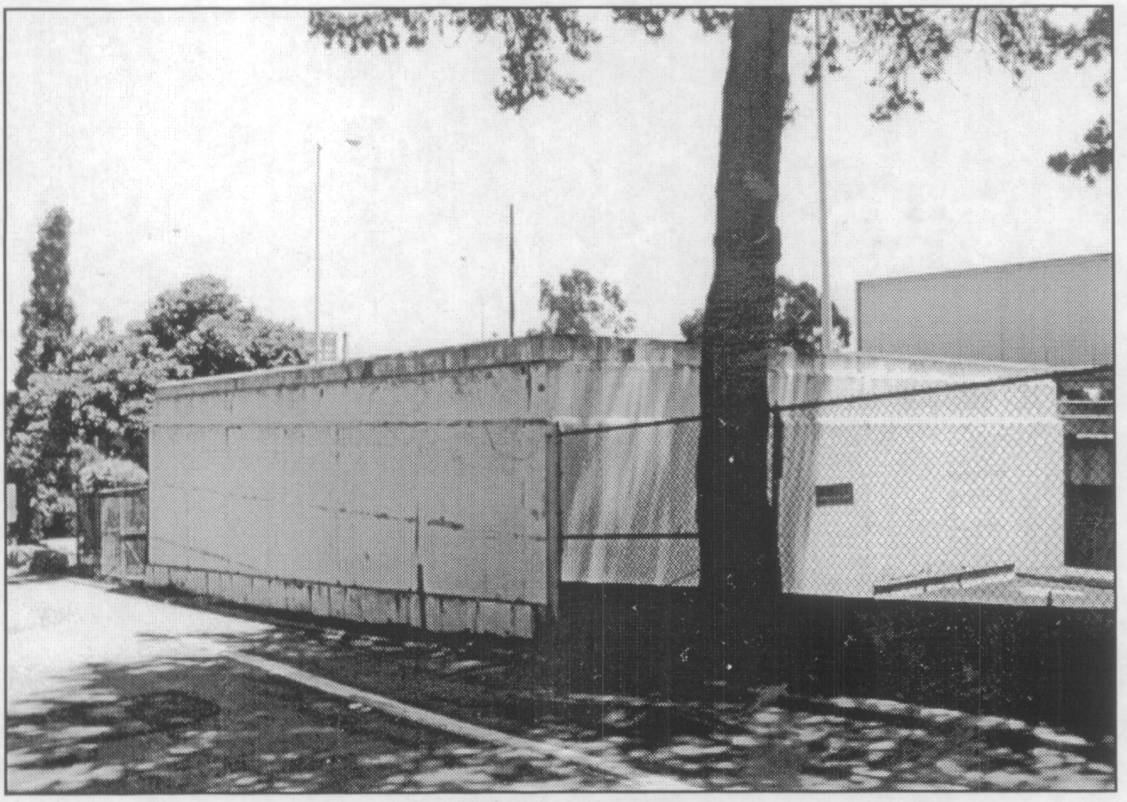
GRAPHIC SCALE 1:8,000

0 50 100 200 m

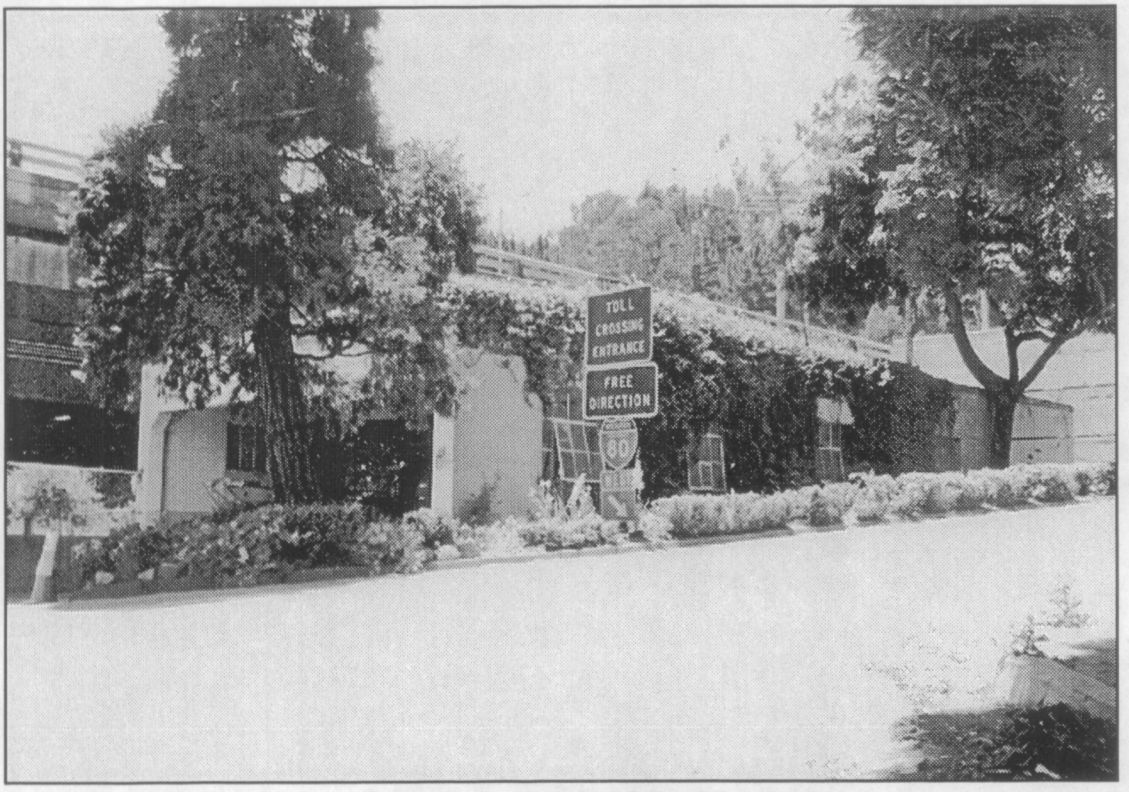
Historic Resources–
Oakland Touchdown Area

Figure 3-22

PDQ&D F-N6 IMP 9/13/98



Caltrans Substation



Caltrans Garage and Substation

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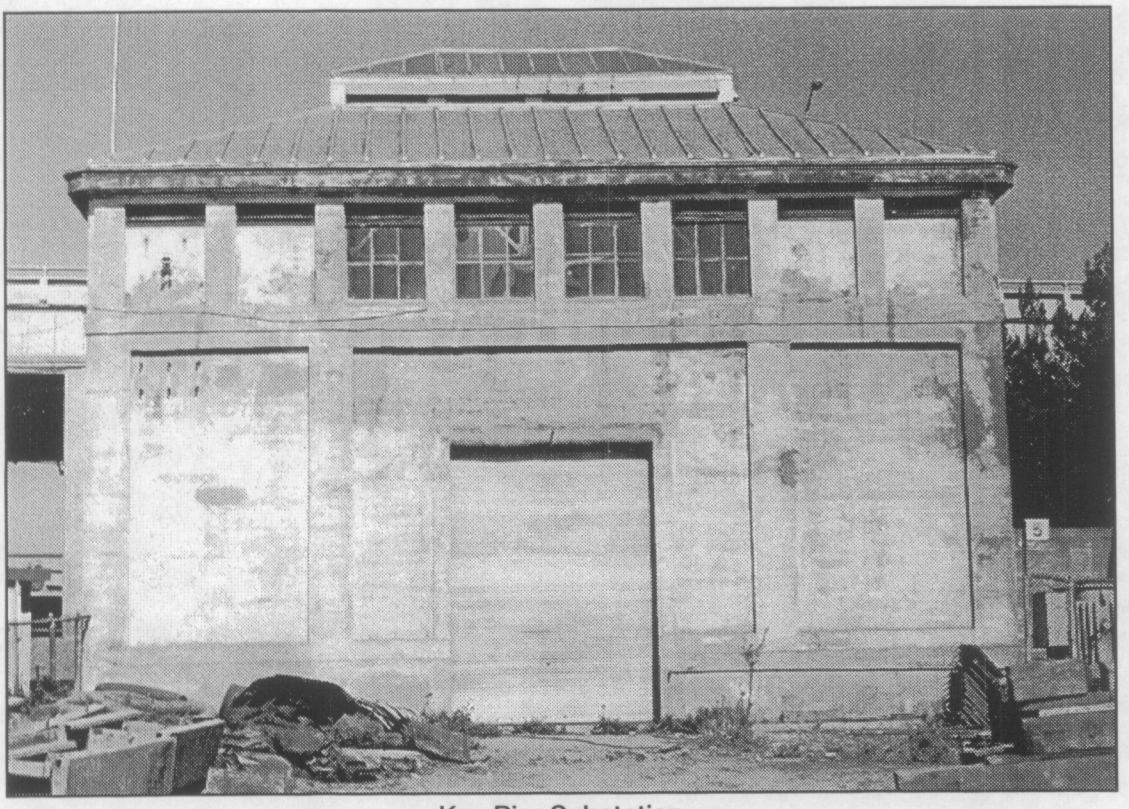
SEISMIC SAFETY
PROJECT

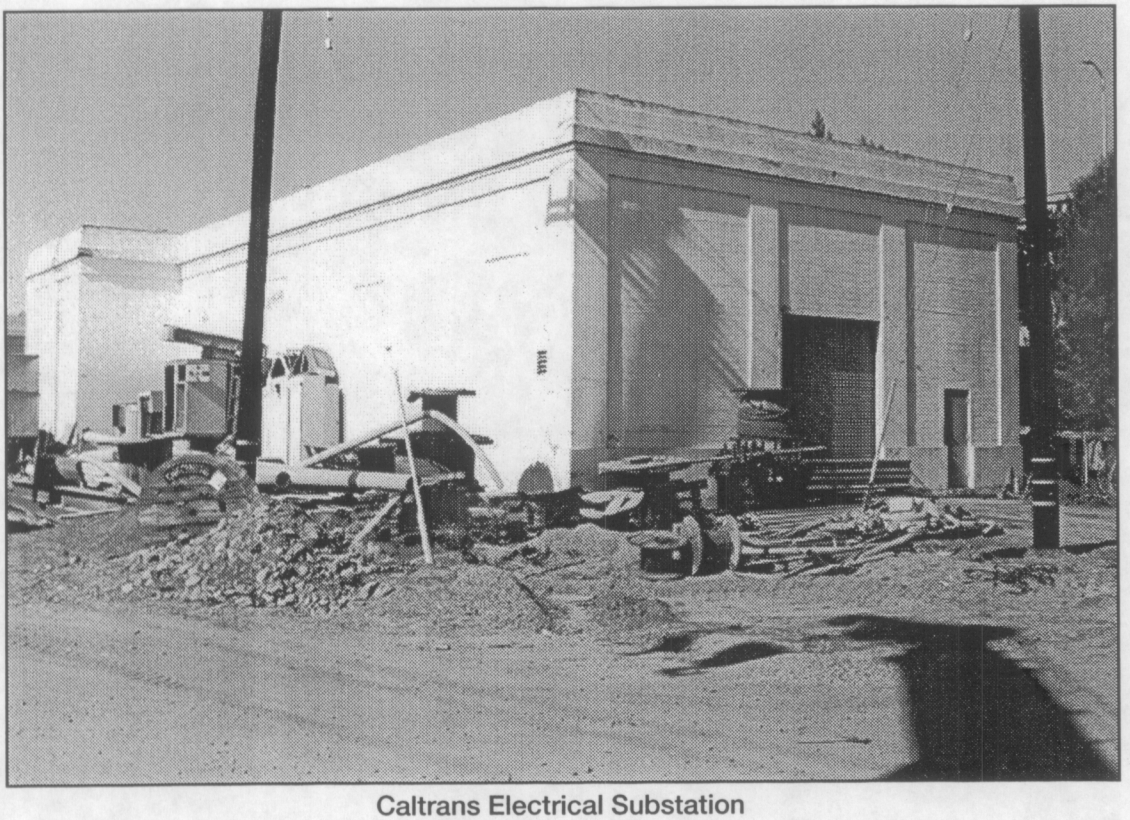
Historic Resources: Caltrans Garage and
Electrical Substation–Yerba Buena Island

Figure 3-23

PDQ&D F-HBLD 9/17/98



Key Pier Substation



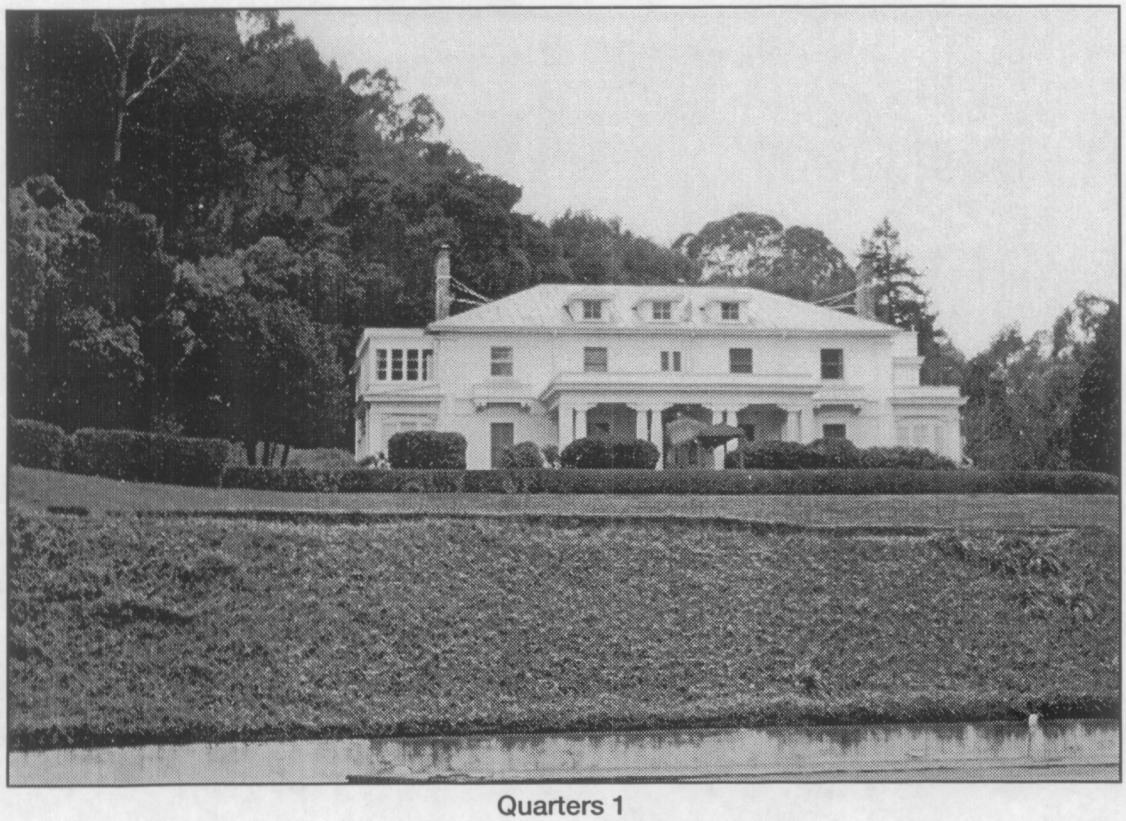
Caltrans Electrical Substation

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Historic Resources: Caltrans Electrical Substation and Key Pier Substation-Oakland Touchdown Area

Figure 3-24

Senior Officers' Quarters Historic District

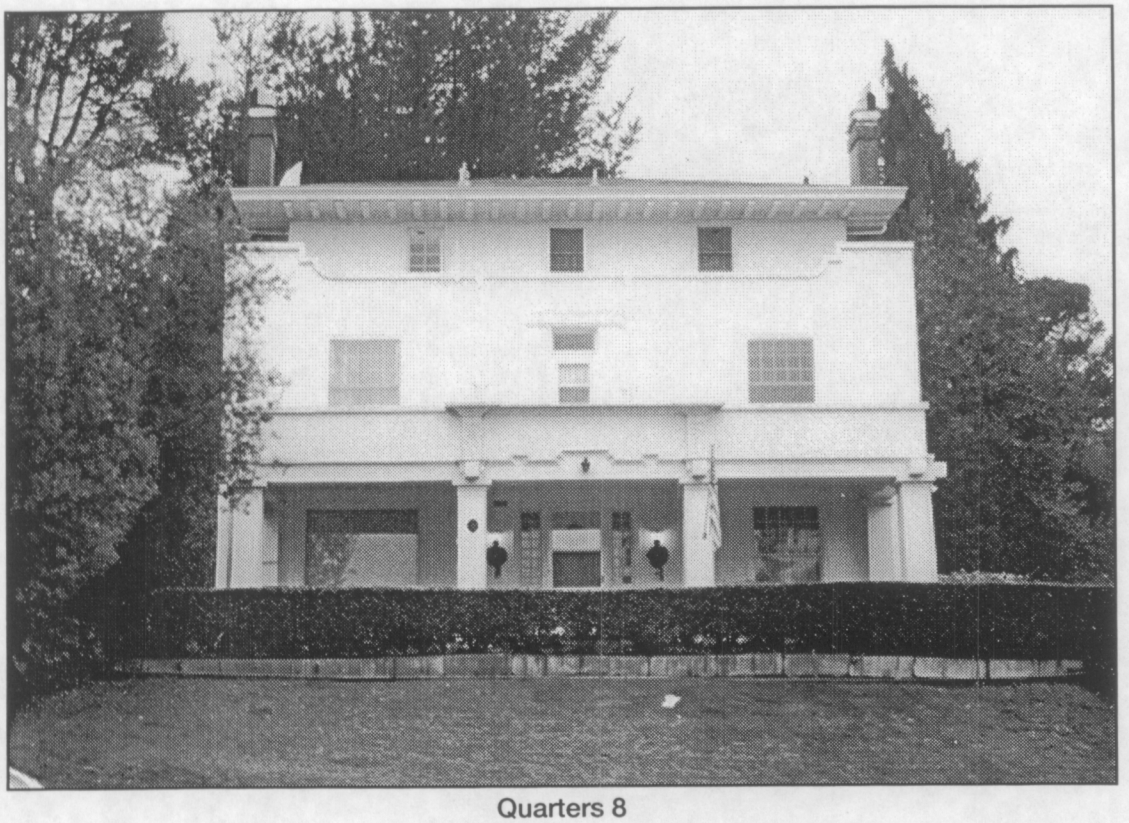


Quarters 1

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Historic Resources: Senior Officers' Quarters Historic District and Quarters 1–Yerba Buena Island

Figure 3-25



Quarters 8

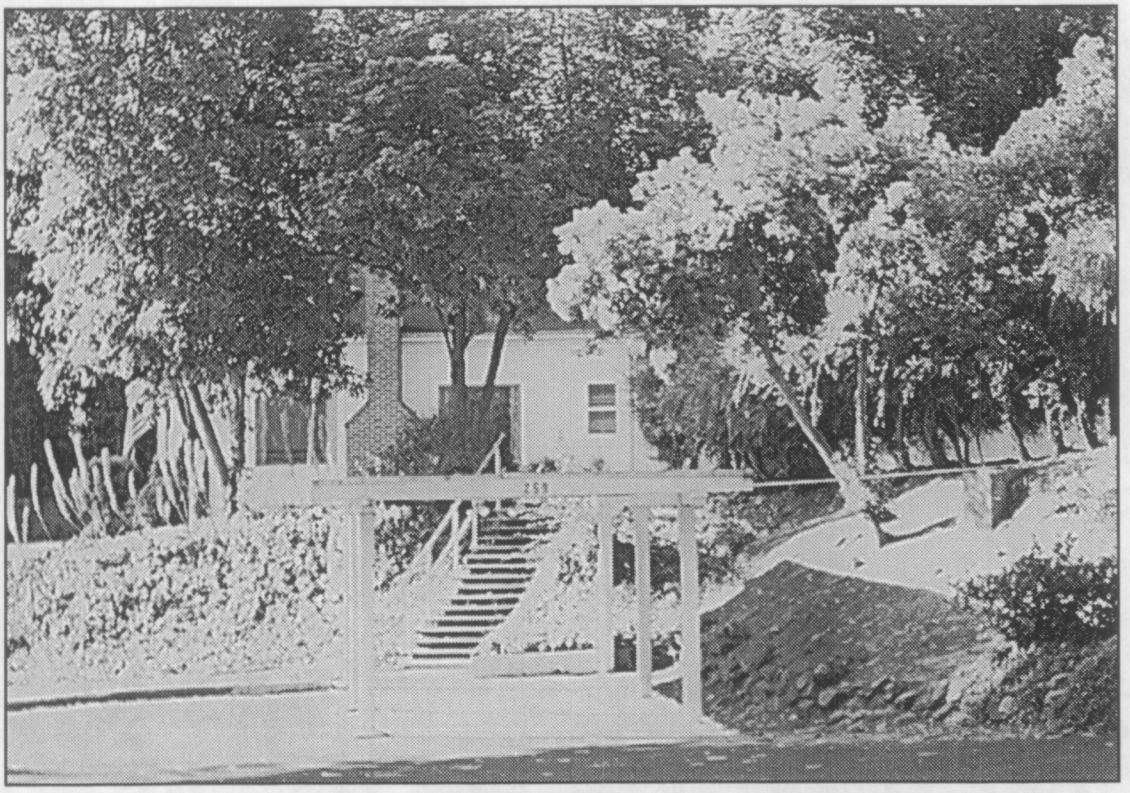
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Historic Resources: Quarters 8
–Yerba Buena Island

Figure 3-26

PDQ&D F-HBLD 9/17/98

Quarters 9

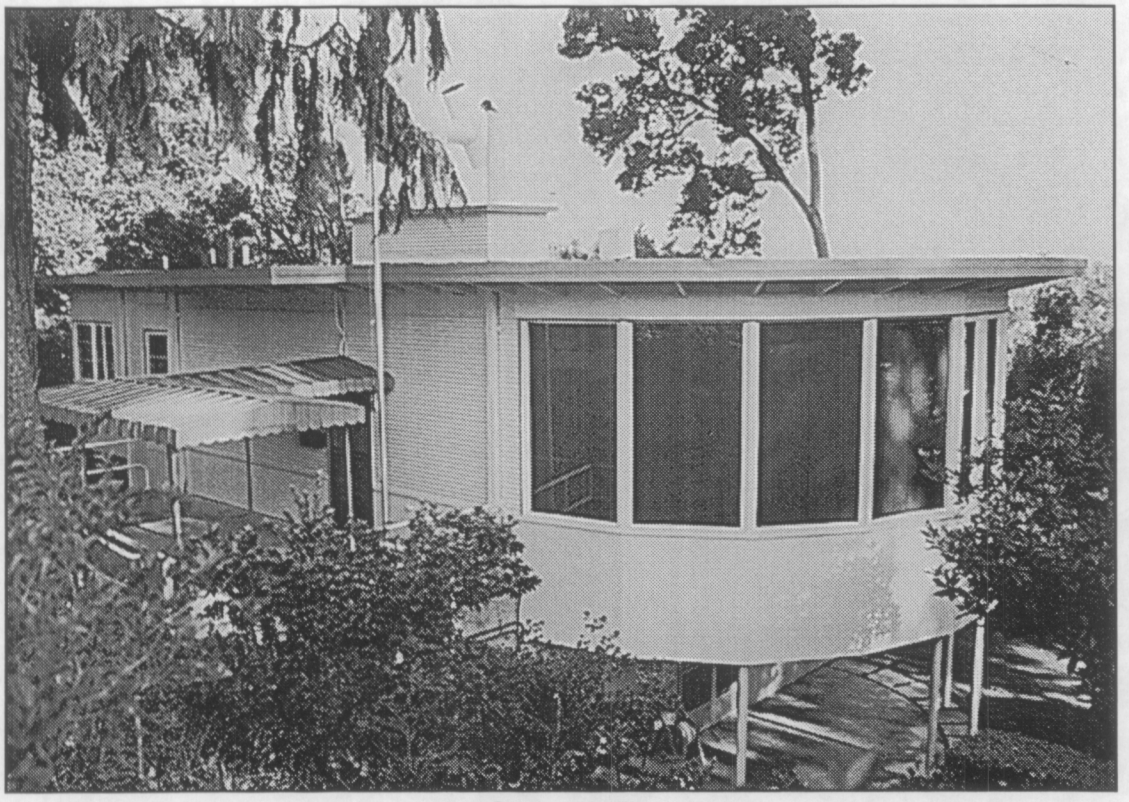


Quarters 9

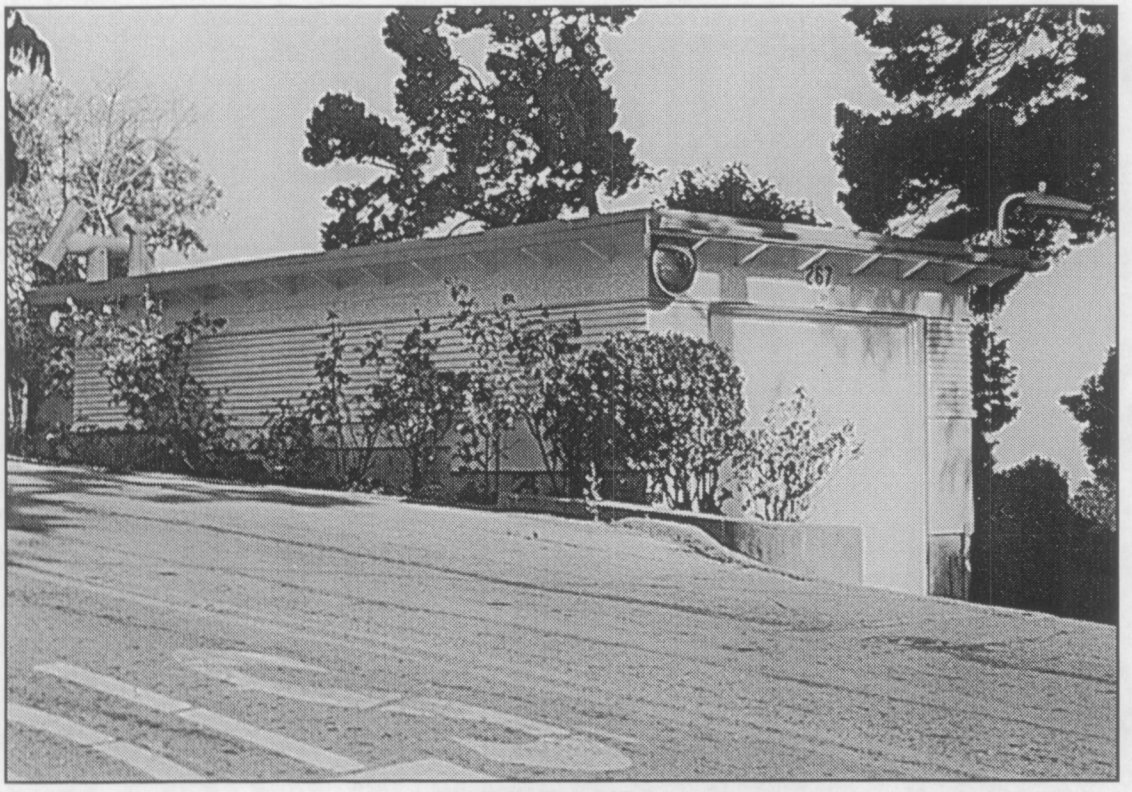
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Historic Resources: Quarters 9–
Yerba Buena Island

Figure 3-27



Quarters 10

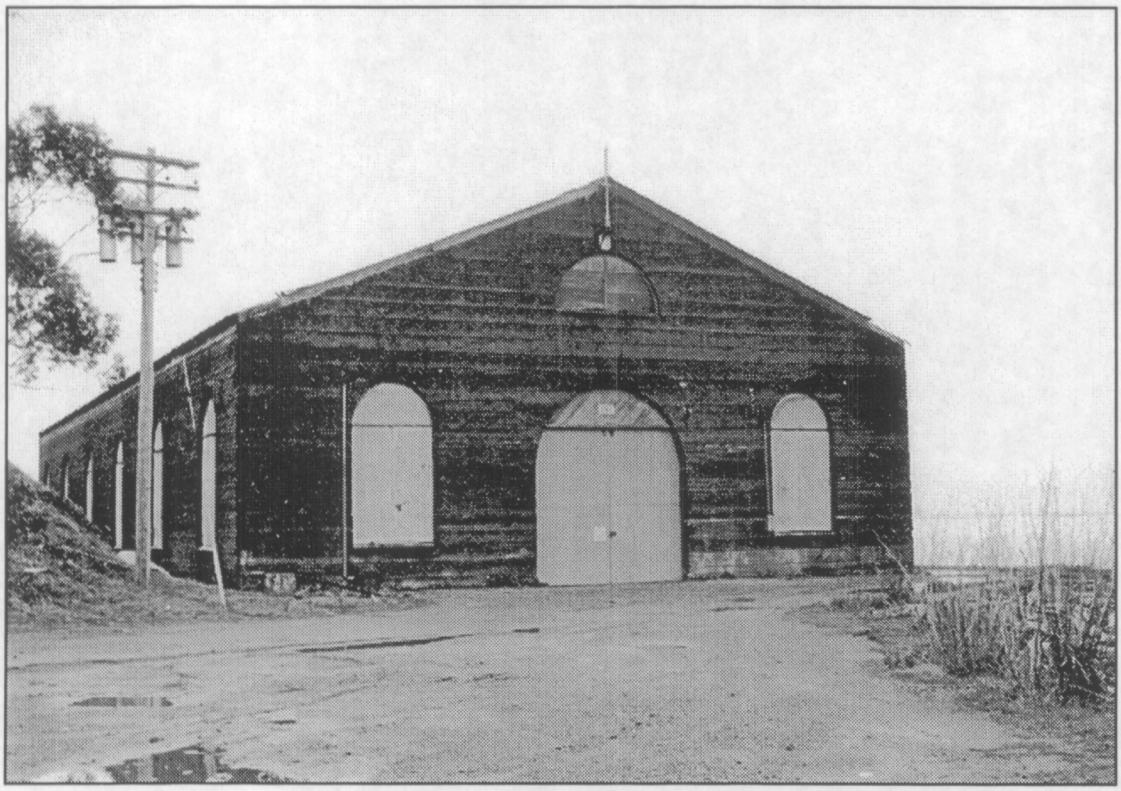


Building 267

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Historic Resources: Quarters 10 and Garage
(Building 267)–Yerba Buena Island

Figure 3-28



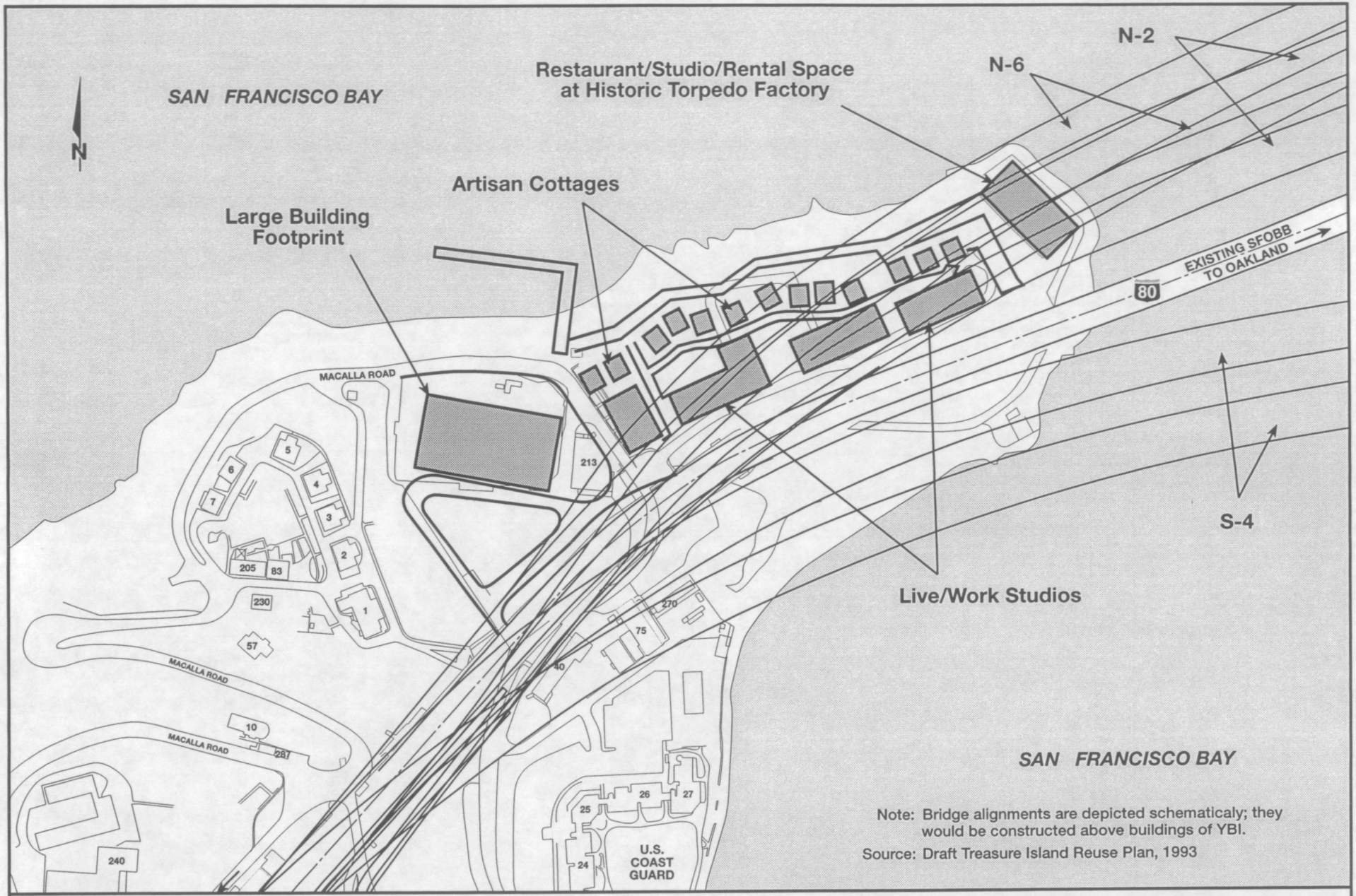
Building 262

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Historic Resources: Building 262–
Yerba Buena Island

Figure 3-29

PDQ&D F-HBLD 9/17/98



SFOBB EAST SPAN SEISMIC SAFETY PROJECT

GRAPHIC SCALE 1:3,000

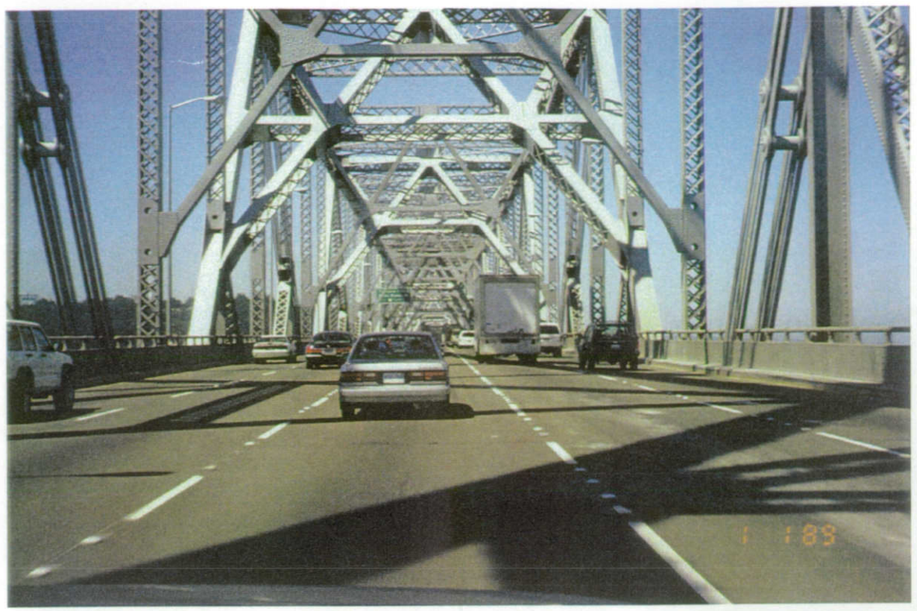
0 25 50 100 m

Potential Project Impacts on Development Scenarios–Yerba Buena Island

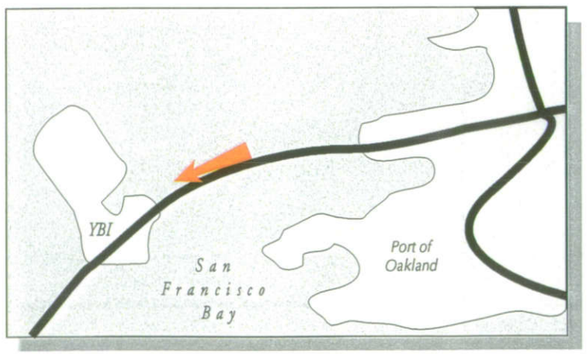
Figure 4-1

PDQ&D F-212 9/10/98

San Francisco - Oakland Bay Bridge
East Span Seismic Safety Project
04-SF-80 KP 12.2/KP 14.3
04-ALA-80 KP 0.0/KP 2.1
EA# 04-012000



Existing Motorist's View—Westbound
In Main Span (Cantilever Section)



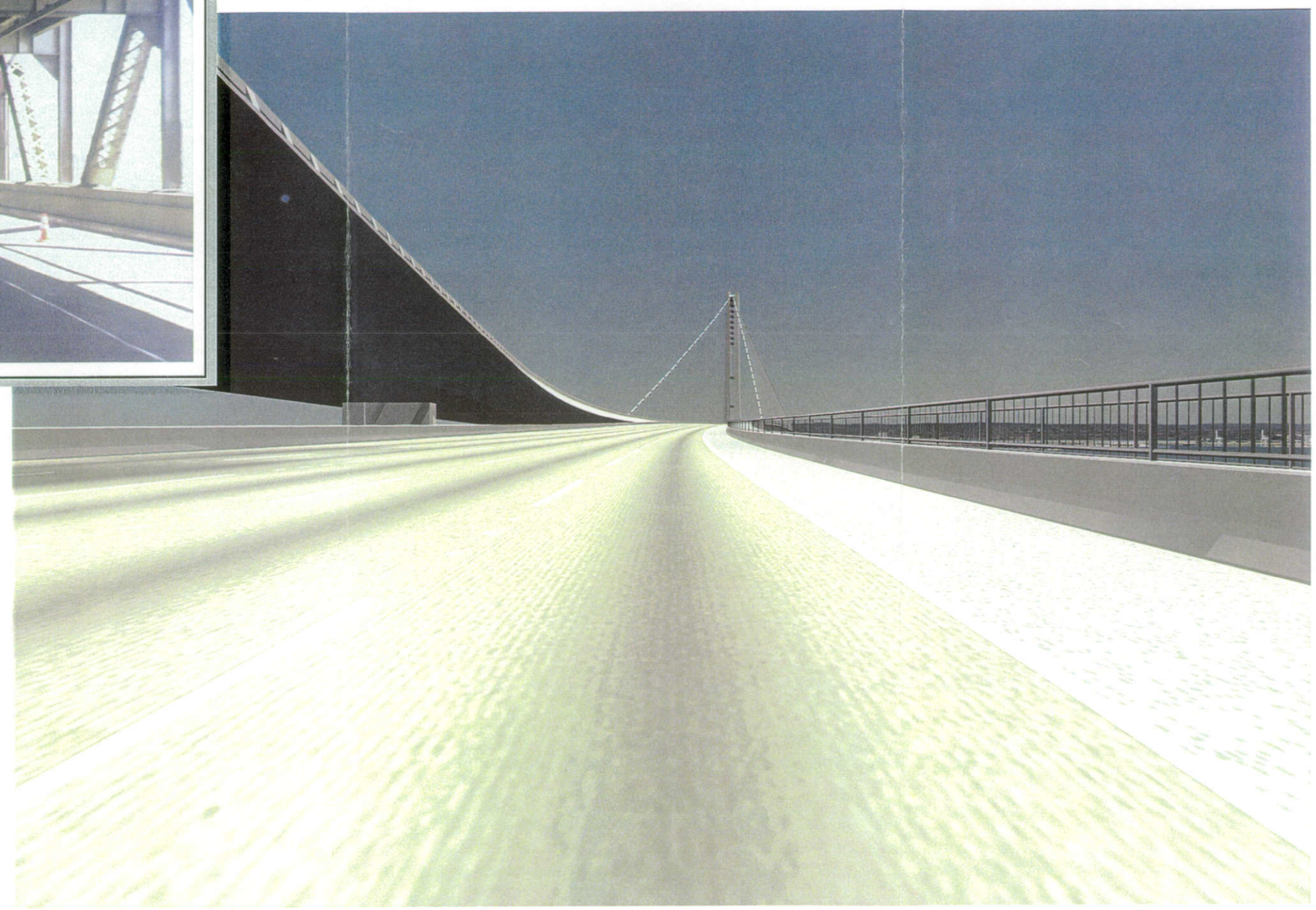
Simulation of Proposed Project
Westbound Motorist's View in Main Span (Signature Section)

Source: Parsons Brinkerhoff; Public Affairs Management

Figure 4-2

San Francisco - Oakland Bay Bridge
East Span Seismic Safety Project
04-SF-80 KP 12.2/KP 14.3
04-ALA-80 KP 0.0/KP 2.1
EA# 04-012000

Existing Motorist's View—Eastbound
Just East of YBI Tunnel



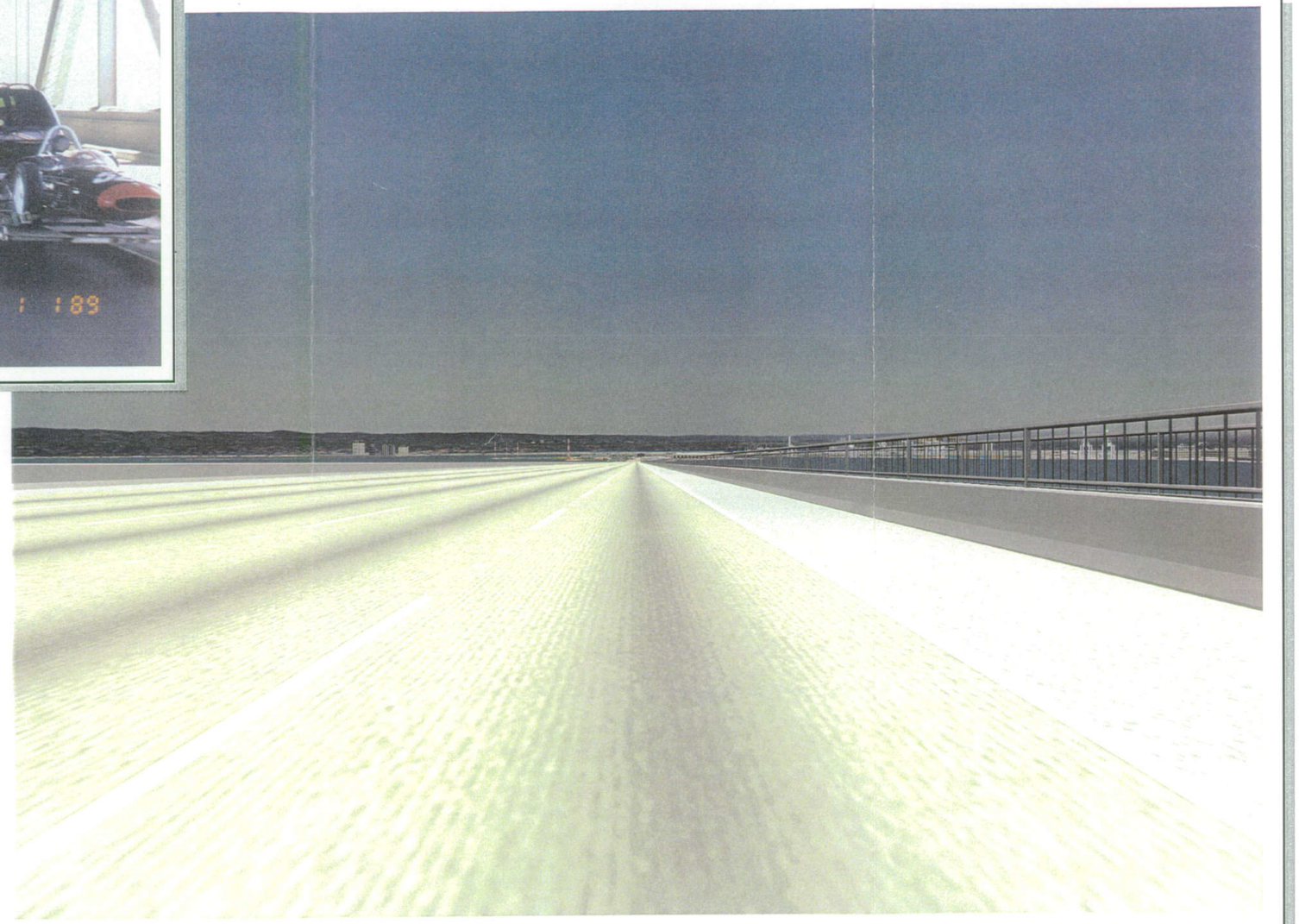
Simulation of Proposed Project
Eastbound Motorist's View Just East of YBI Tunnel

Source: Parsons Brinkerhoff; Public Affairs Management

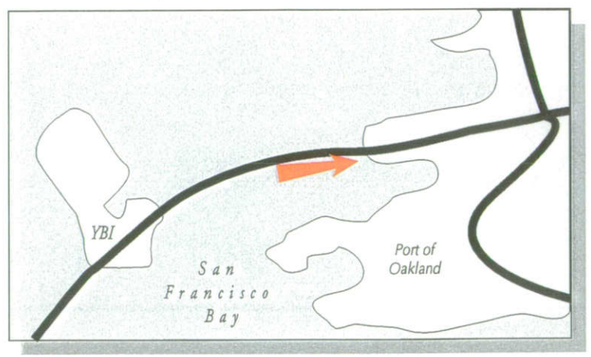
Figure 4-3

San Francisco - Oakland Bay Bridge
East Span Seismic Safety Project
04-SF-80 KP 12.2/KP 14.3
04-ALA-80 KP 0.0/KP 2.1
EA# 04-012000

Existing Motorist's View—Eastbound
In Decline Section



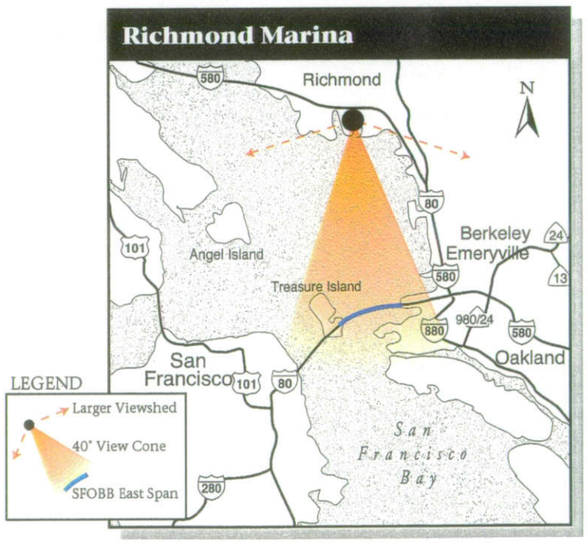
Simulation of Proposed Project
Eastbound Motorist's View In Decline Section Heading Eastbound



Source: Parsons Brinkerhoff; Public Affairs Management

Figure 4-4

Existing Conditions
From Richmond Marina

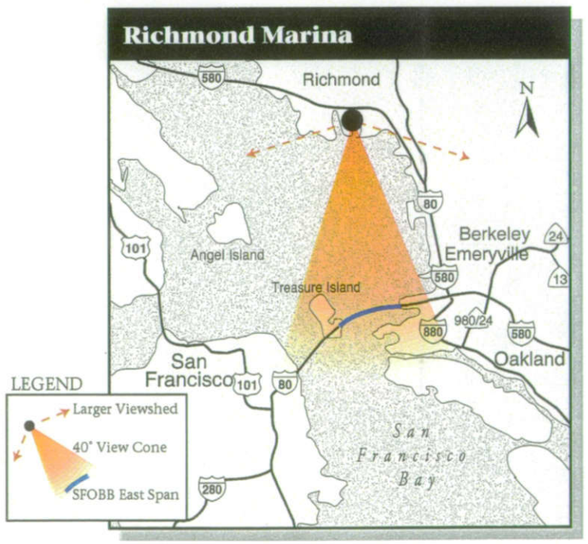


Simulation of Proposed Project
Replacement Alternative N-6 Skyway Design Variation

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

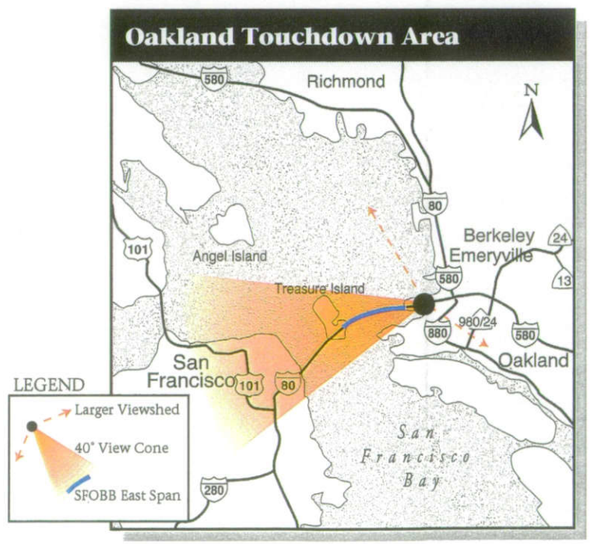
Figure 4-5

Existing Conditions
From Richmond Marina



Simulation of Proposed Project
Replacement Alternative N-6, Signature Bridge Design Variation (Single Tower Cable-Stayed Design)

Existing Conditions
From Oakland Touchdown Area

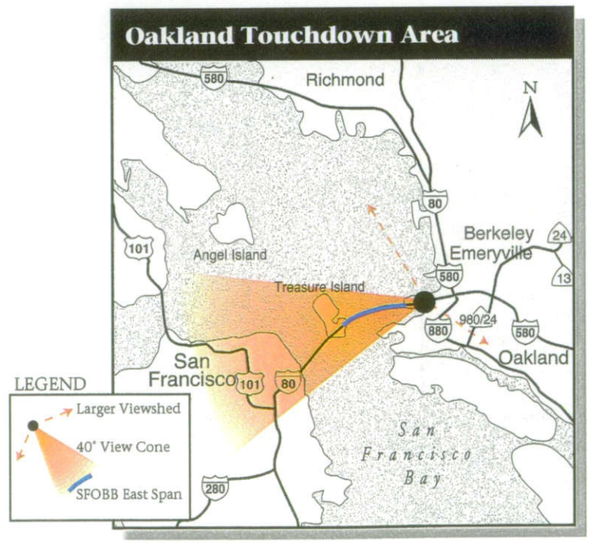


Simulation of Proposed Project
Replacement Alternative N-6, Signature Bridge Design Variation (Single Tower Suspension Design)

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Figure 4-7

Existing Conditions
From Oakland Touchdown Area



Simulation of Proposed Project
Replacement Alternative S-4, Signature Bridge Design Variation (Single Tower Cable-Stayed Design)

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Figure 4-8

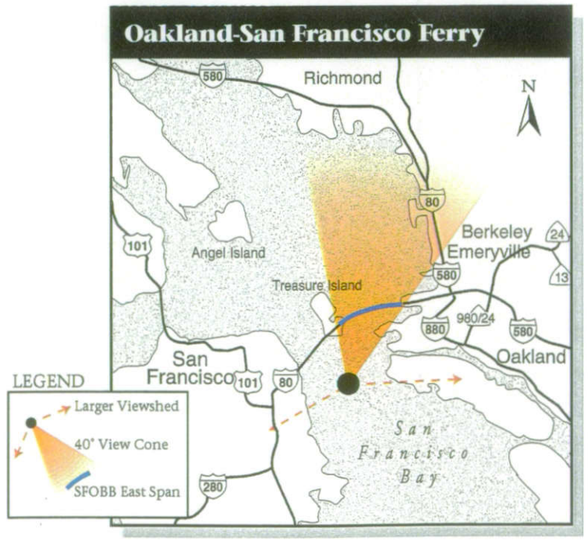
Existing Conditions
From Oakland-San Francisco Ferry

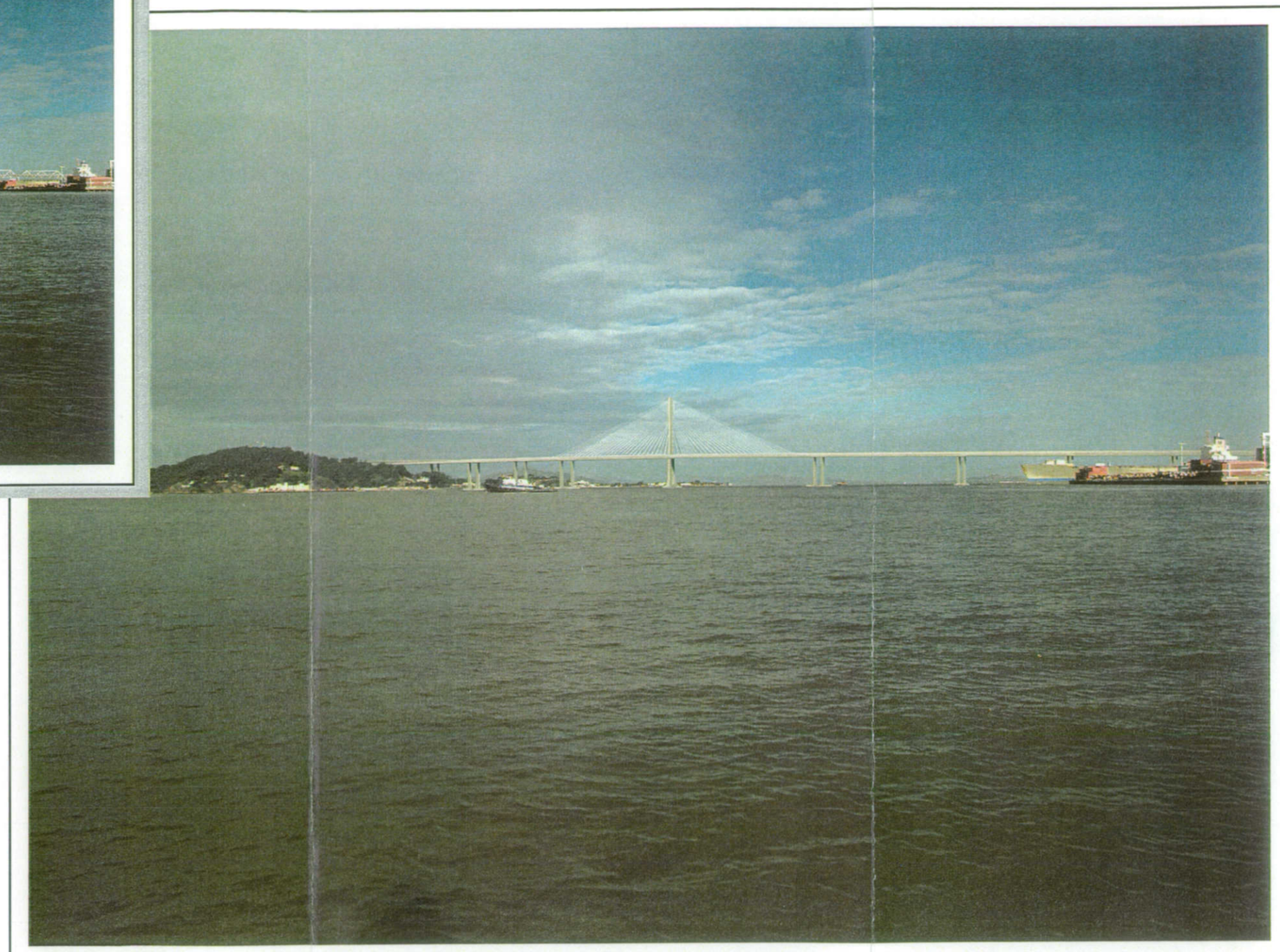
Simulation of Proposed Project
Replacement Alternative S-4, Skyway Design Variation

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Figure 4-9

Existing Conditions
From Oakland-San Francisco Ferry

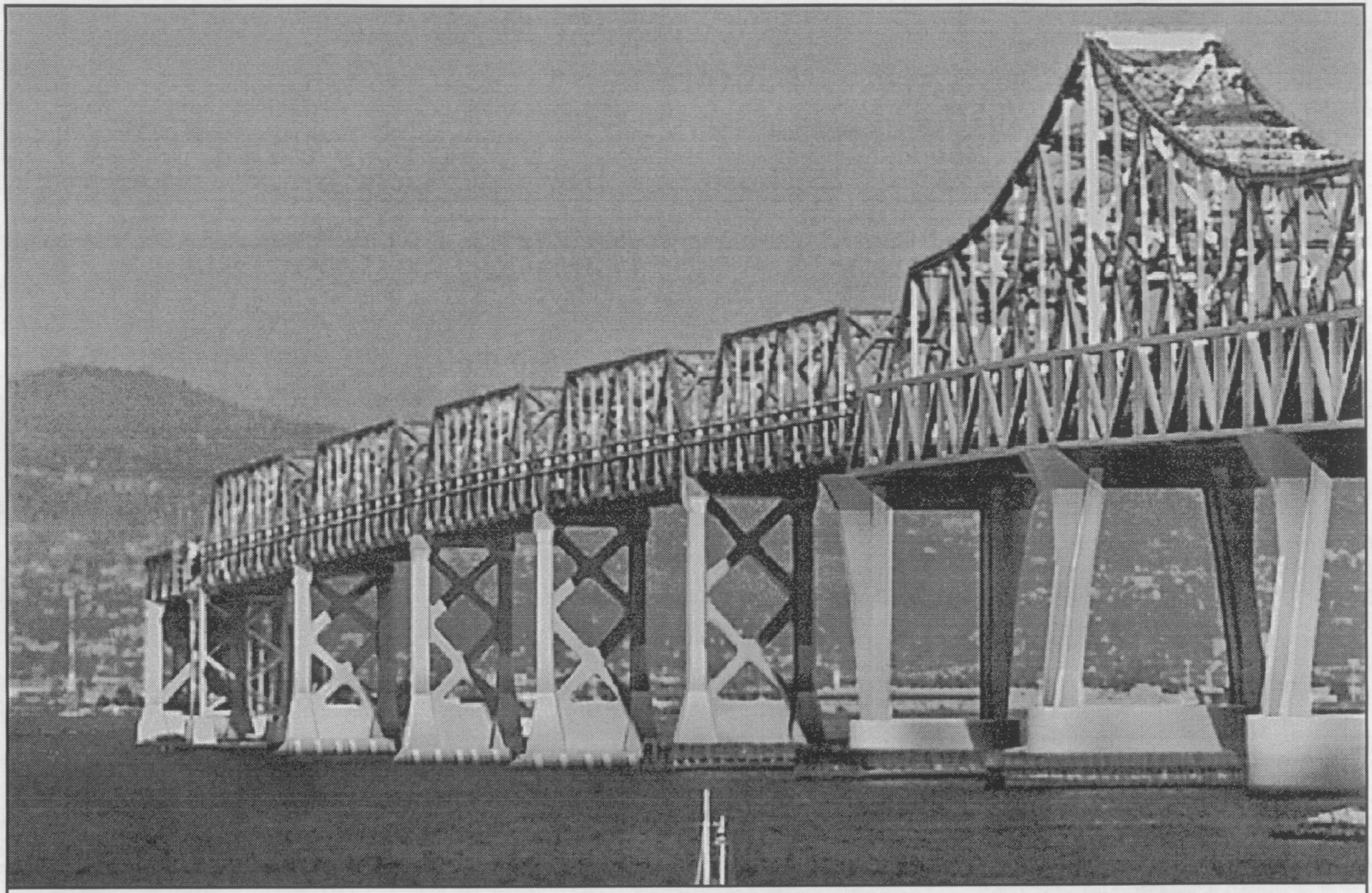




Simulation of Proposed Project
Replacement Alternative S-4, Signature Bridge Design Variation (Single Tower Cable-Stayed Design)

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Figure 4-10

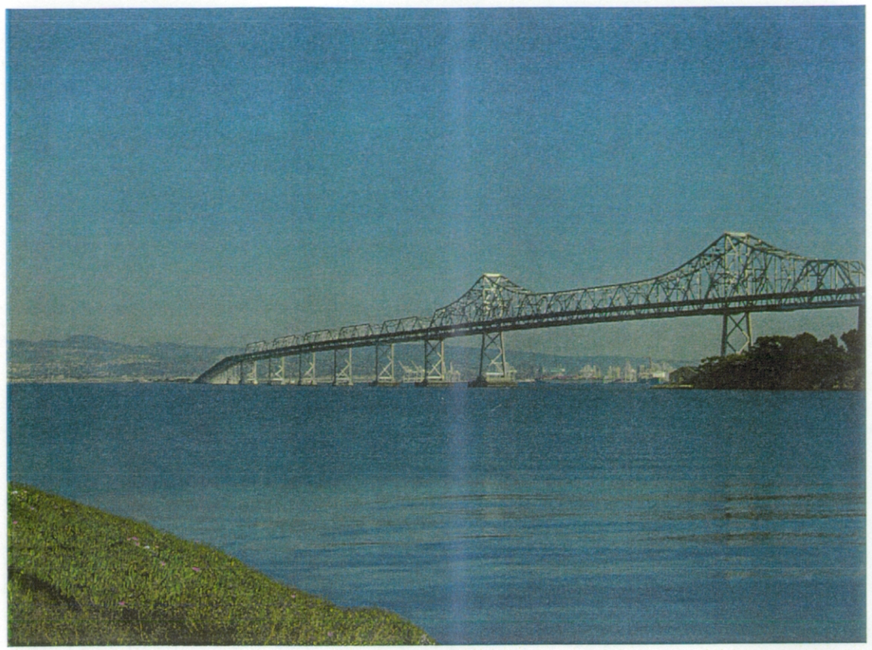


SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

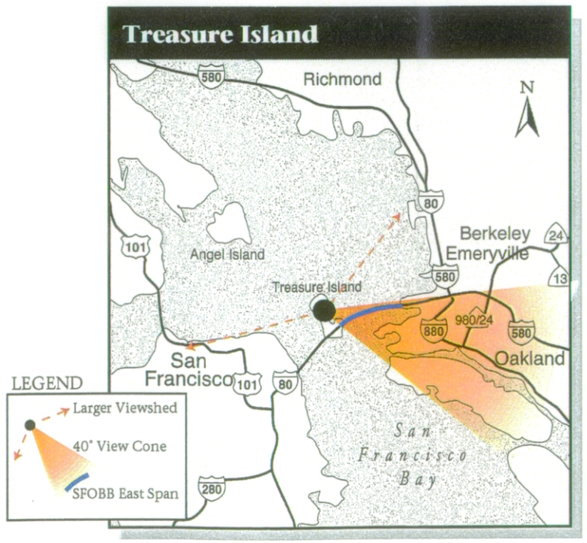
Photo Simulation Retrofit Existing Bridge Design

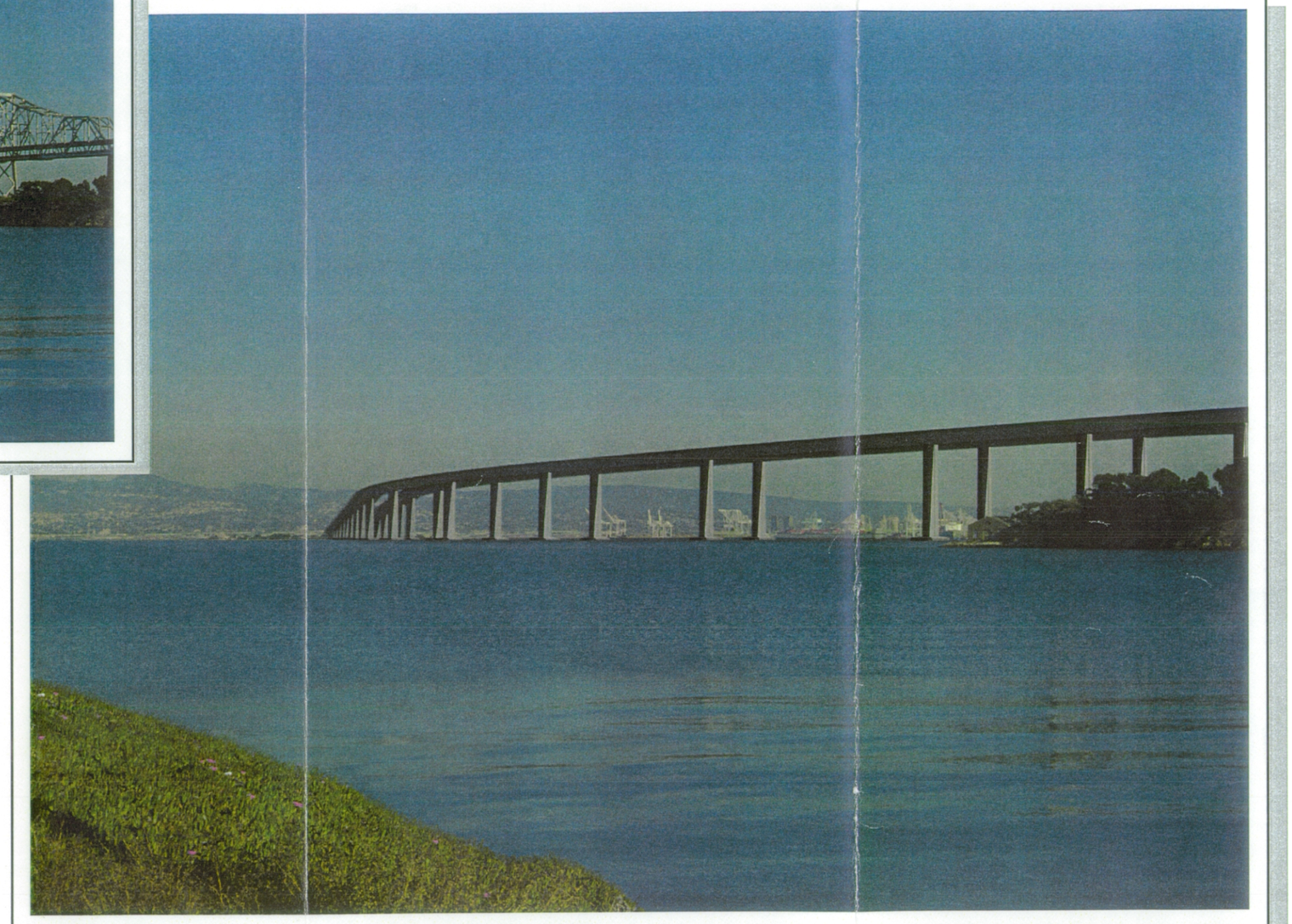
Figure 4-11

PBQ&D SIM-R 9/8/98



Existing Conditions
From Treasure Island

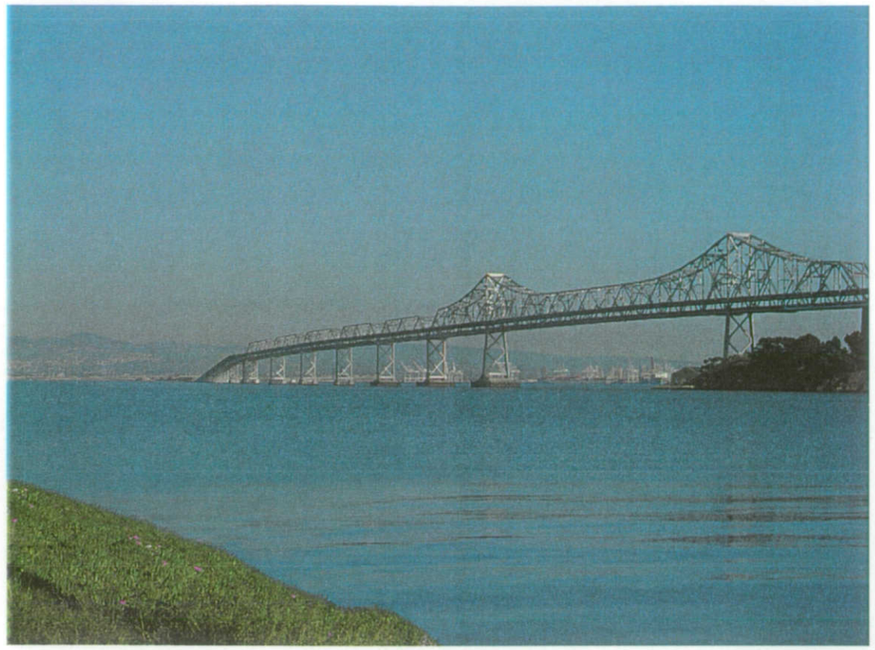




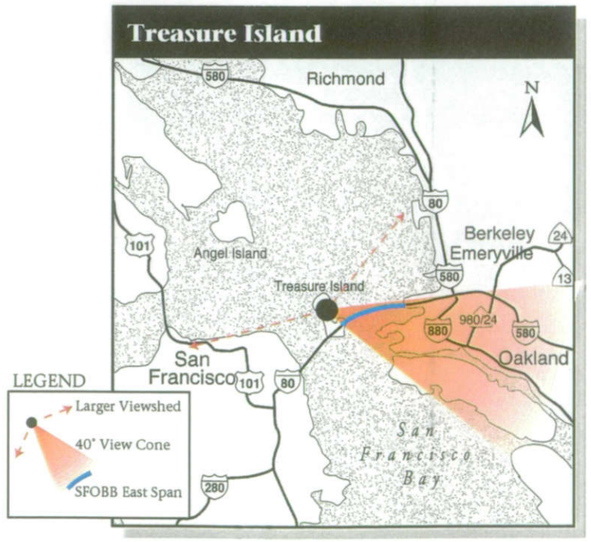
Simulation of Proposed Project
Replacement Alternative N-6, Skyway Design Variation

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Figure 4-12



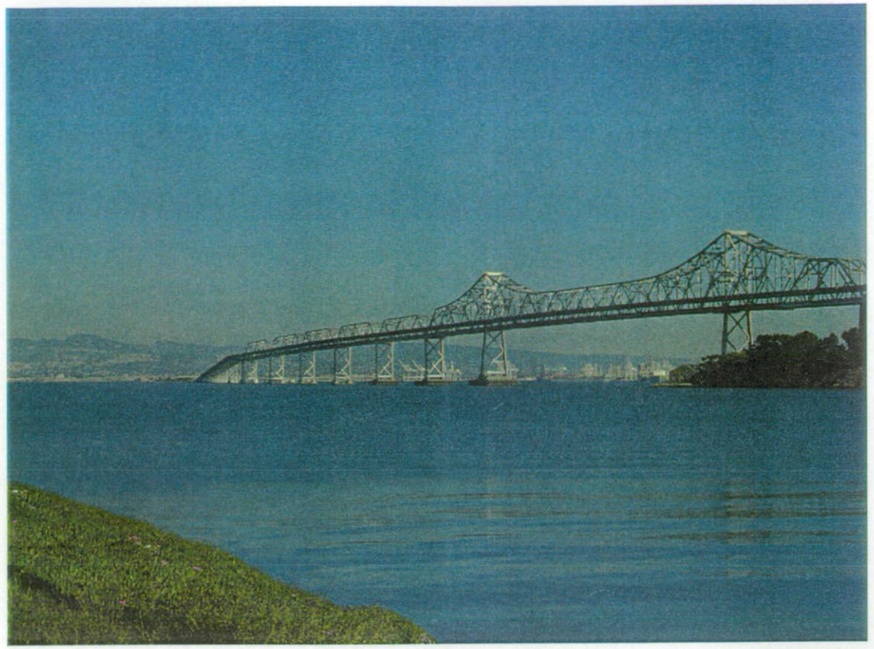
Existing Conditions
From Treasure Island



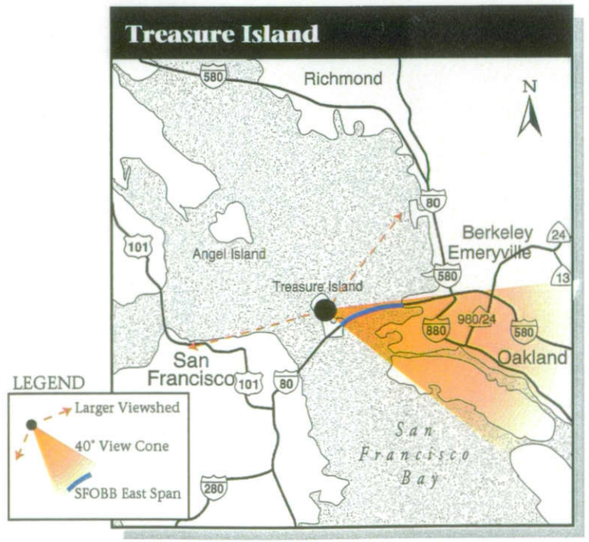
Simulation of Proposed Project
Replacement Alternative S-4, Skyway Design Variation

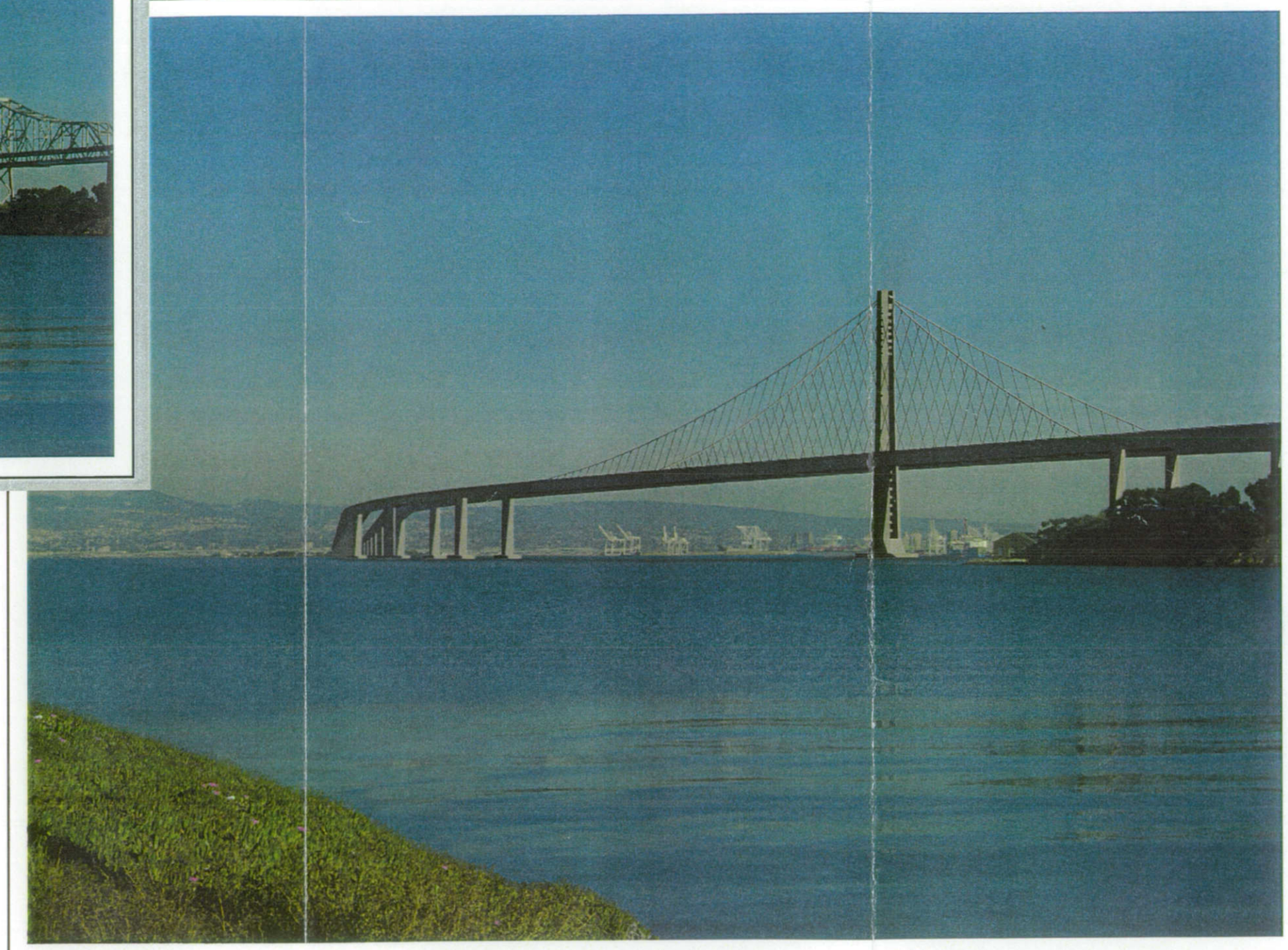
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Figure 4-13

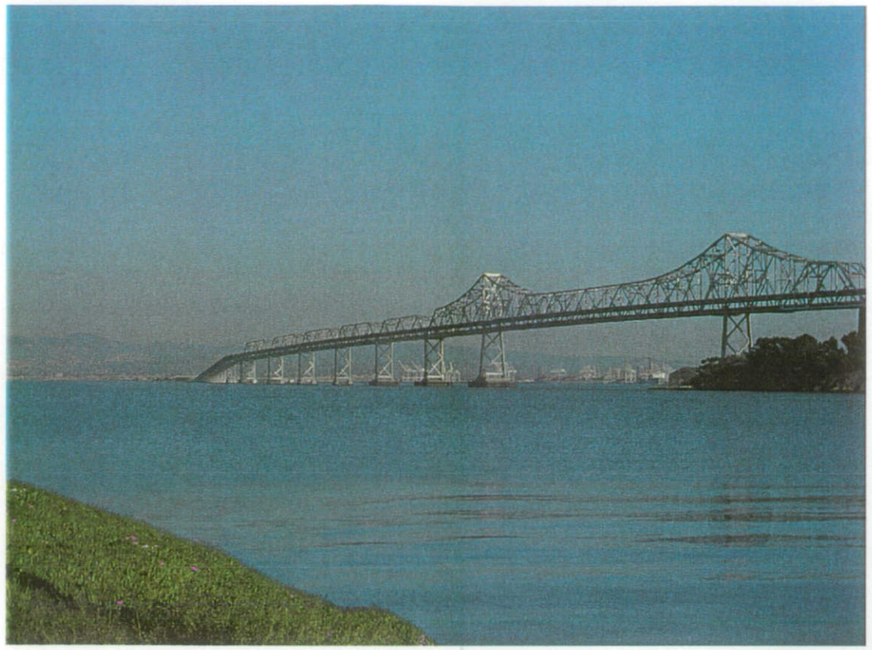


Existing Conditions
From Treasure Island

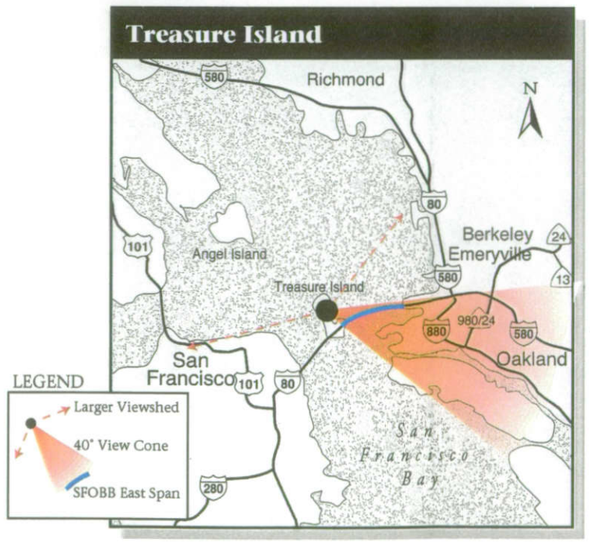




Simulation of Proposed Project
Replacement Alternative N-6, Signature Bridge Design Variation (Single Tower Suspension Design)



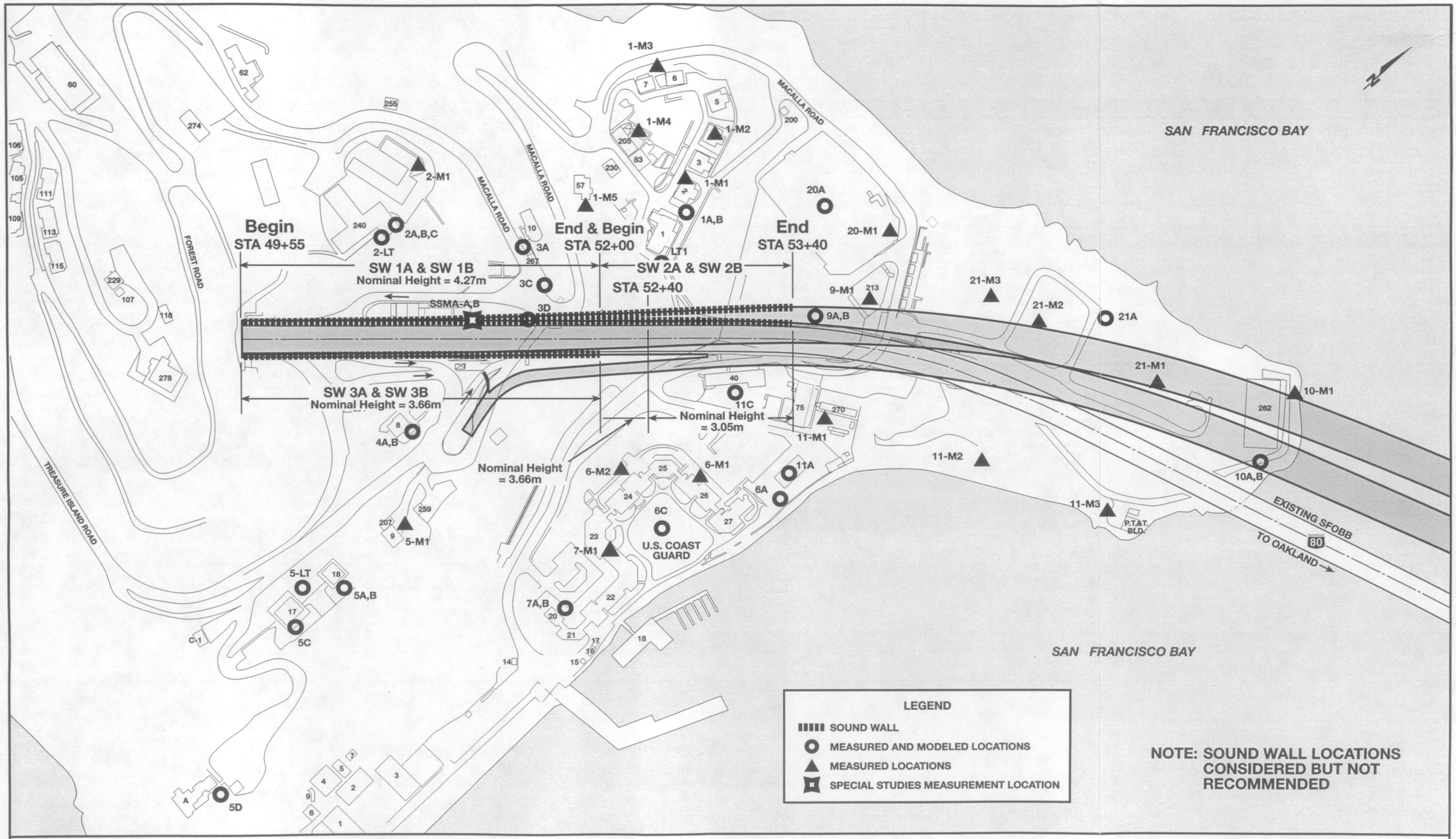
Existing Conditions
From Treasure Island



Simulation of Proposed Project
Replacement Alternative S-4, Signature Bridge Design Variation (Single Tower Suspension Design)

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

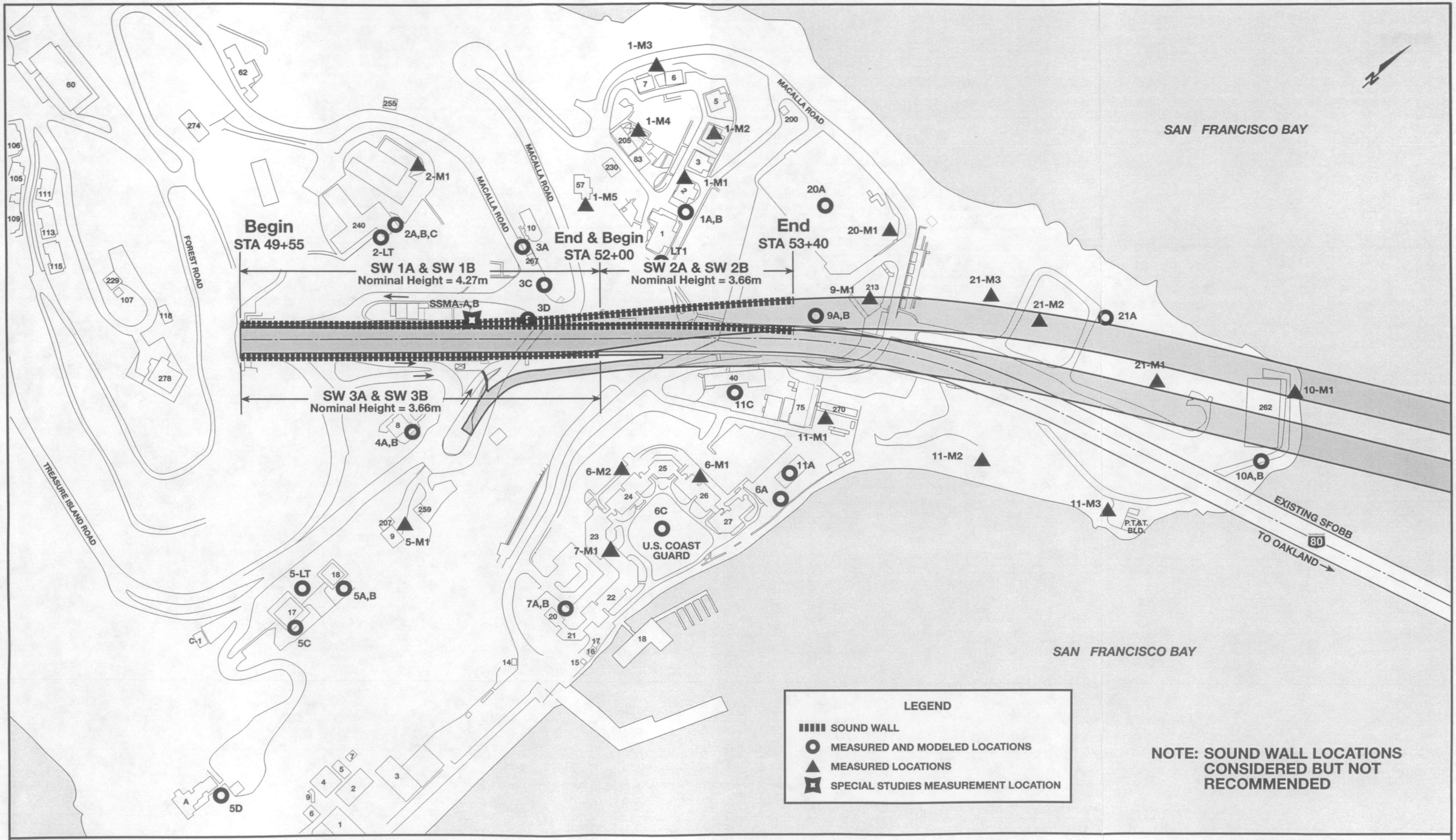
Figure 4-15



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Sound Wall Locations & Heights–
N-2 Replacement Alternative–Yerba Buena Island
Figure 4-16

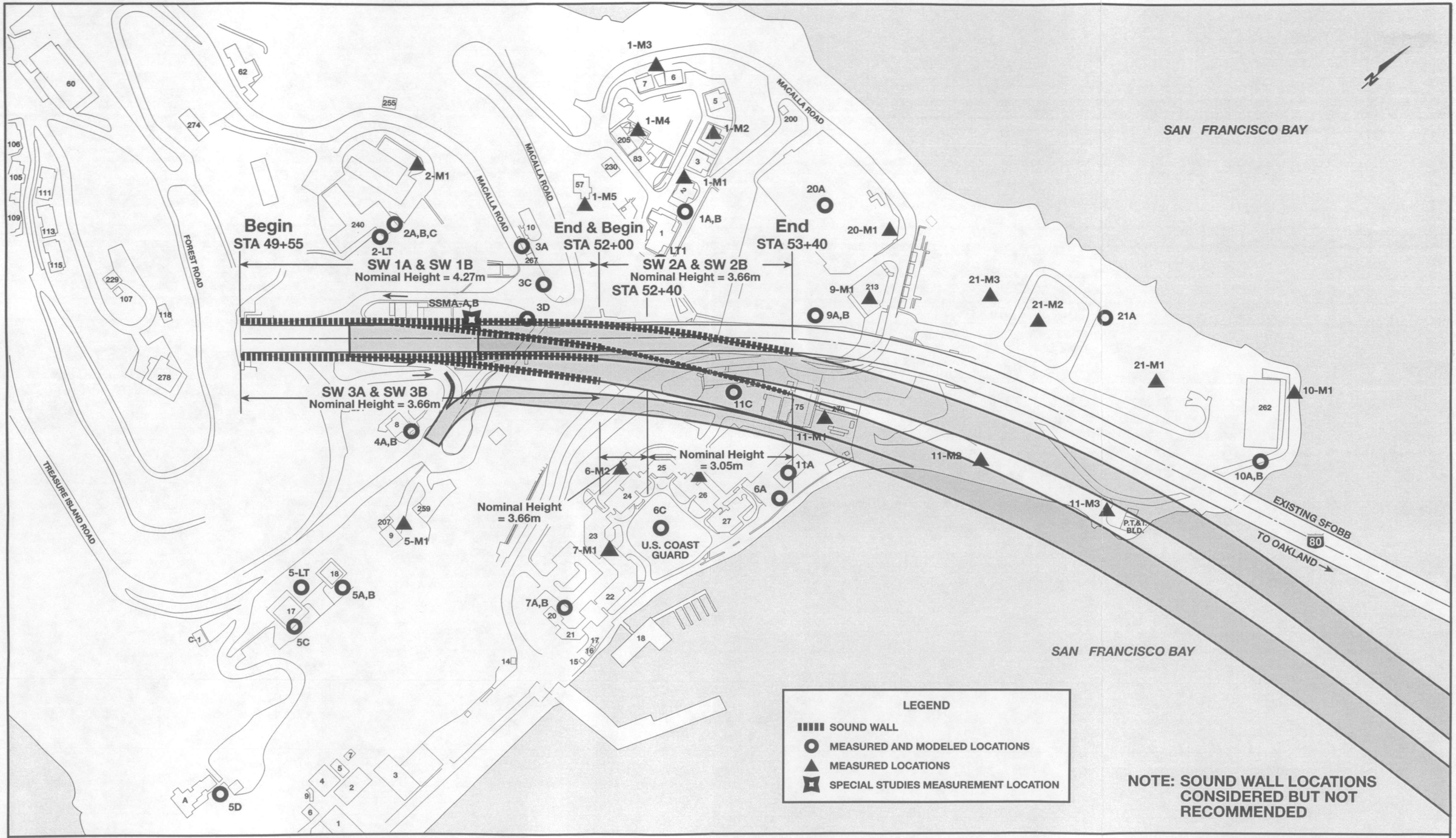
PDQ&D F-226-N2 9/17/98



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Sound Wall Locations & Heights–
N-6 Replacement Alternative–Yerba Buena Island
Figure 4-17

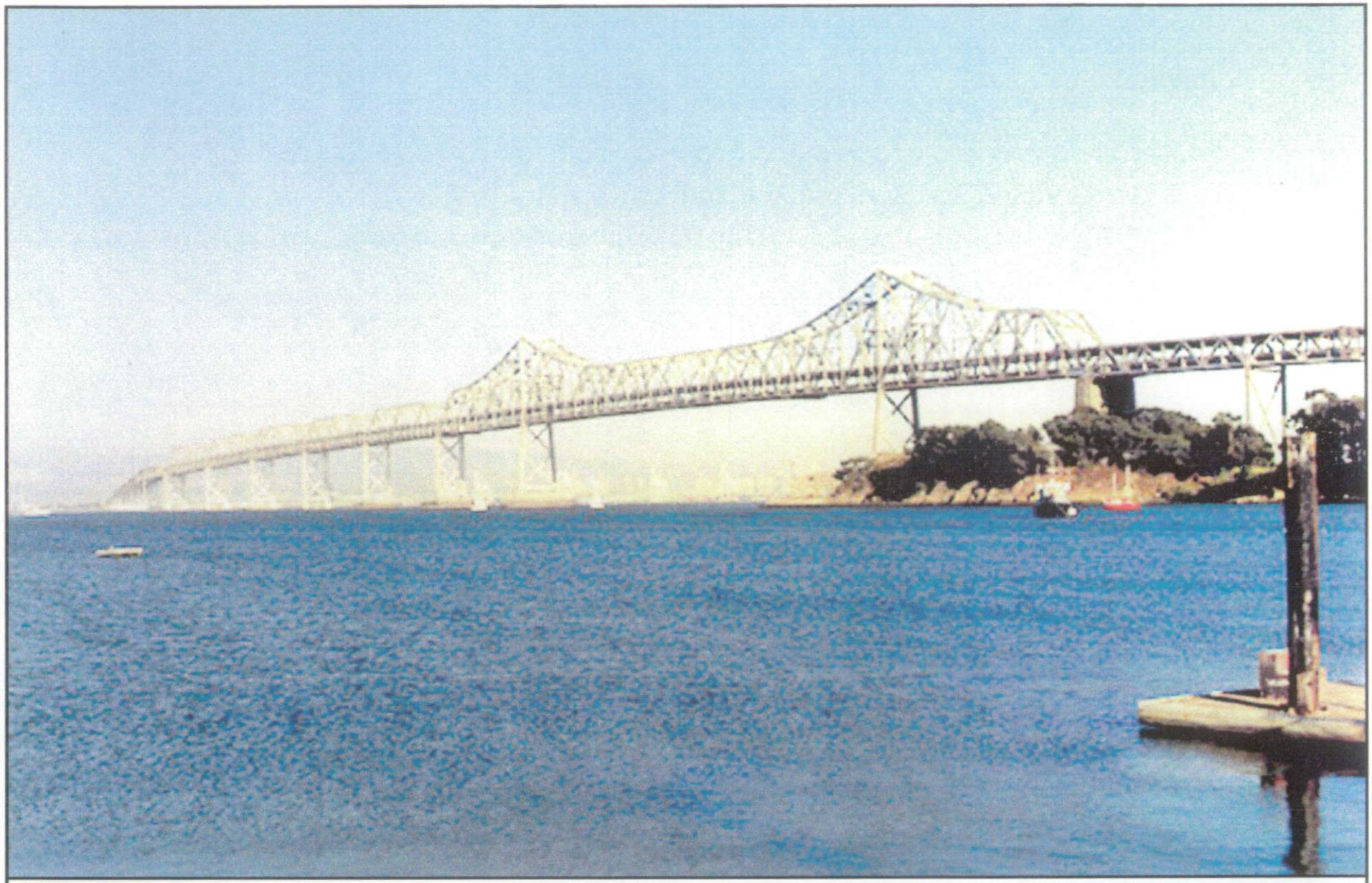
PDQ&D F-226-N2 9/17/98



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Sound Wall Locations & Heights–
S-4 Replacement Alternative–Yerba Buena Island
Figure 4-18

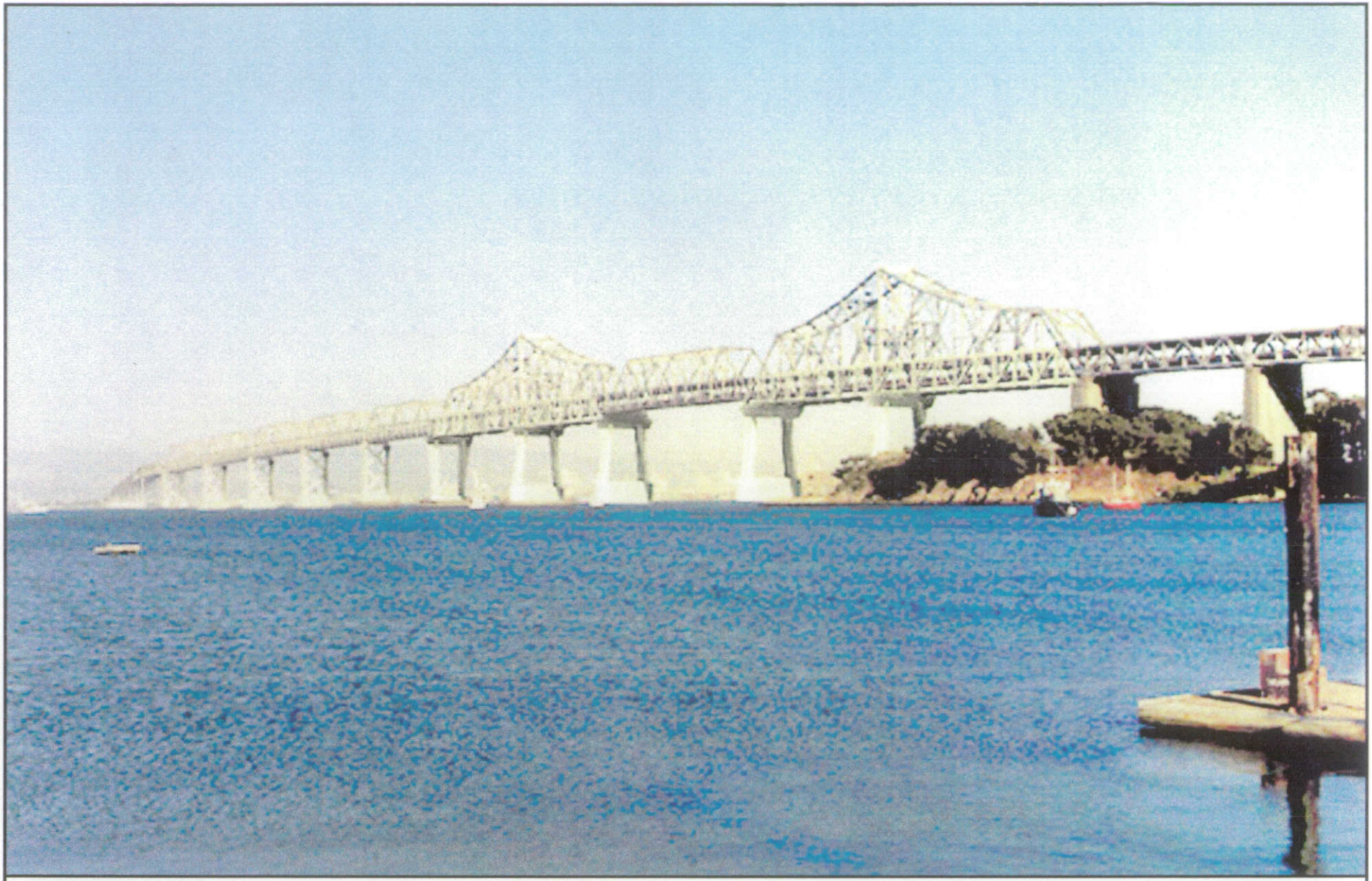
PDQ&D F-226-N2 9/17/98



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

View of Existing Bridge

Figure 6-1

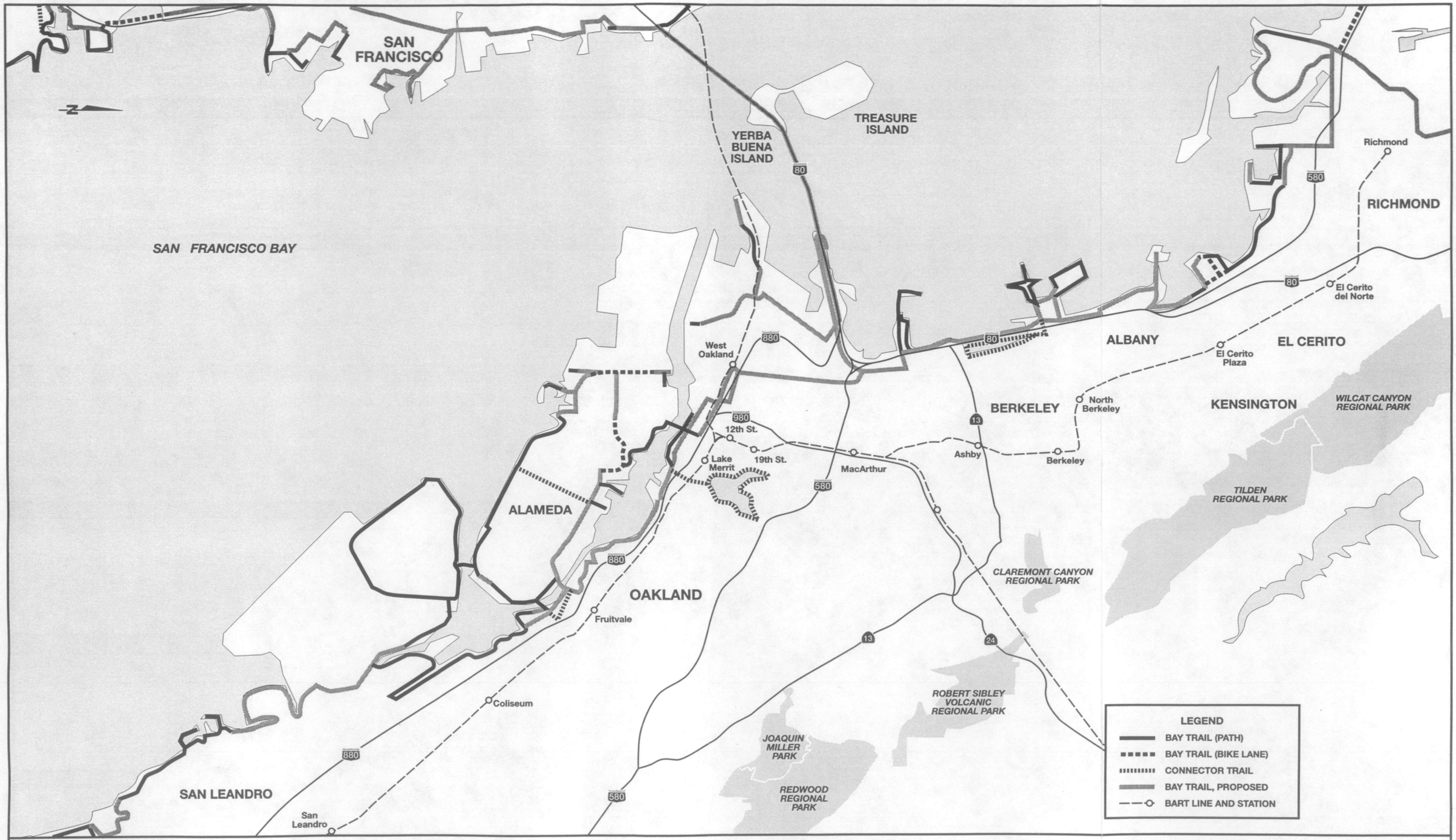


SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Photo Simulation Retrofit Existing Bridge Design

Figure 6-2

PBQ&D SIM-R 9/8/98

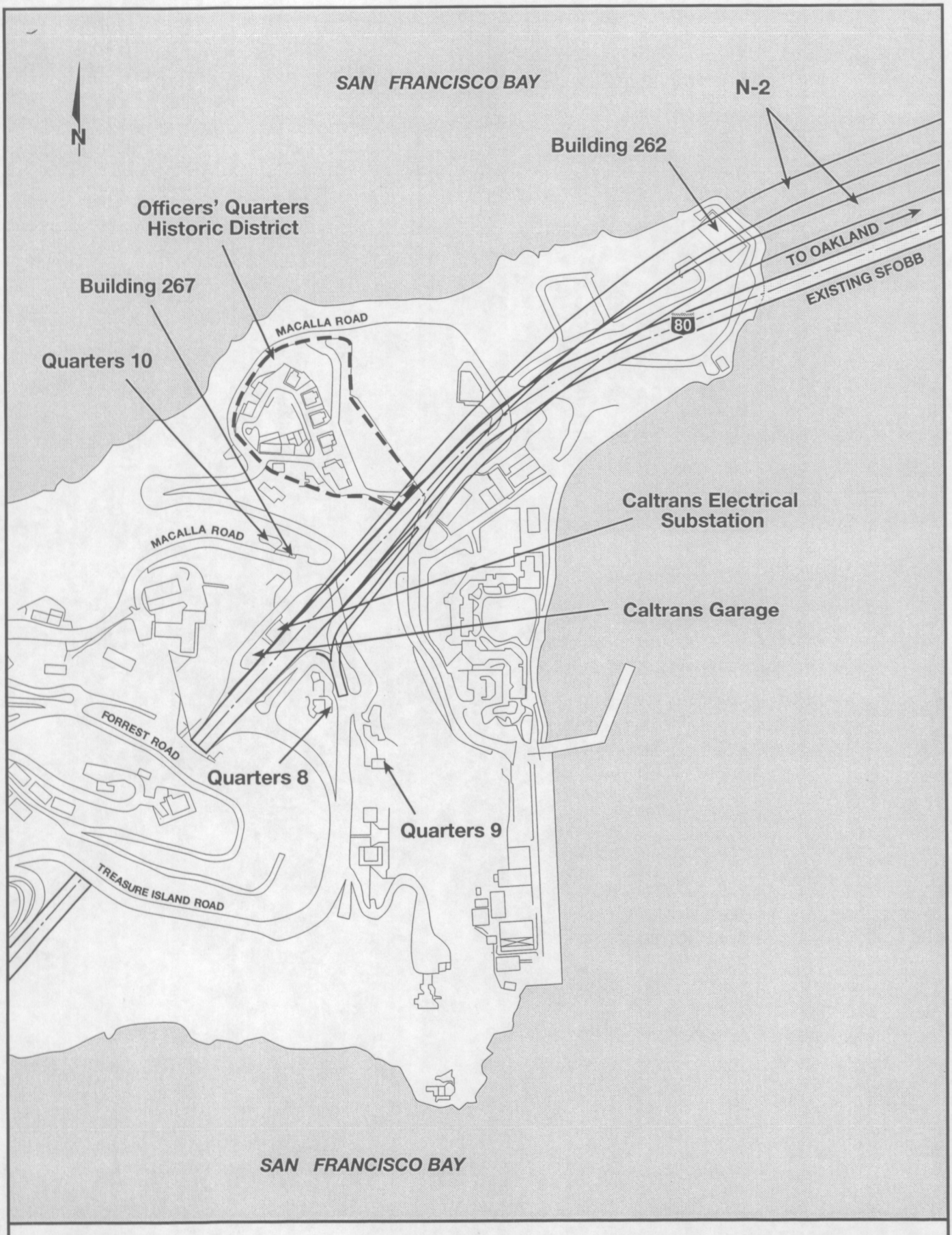


SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

NO SCALE

ABAG Bay Trail-Central East Bay

Figure 6-3

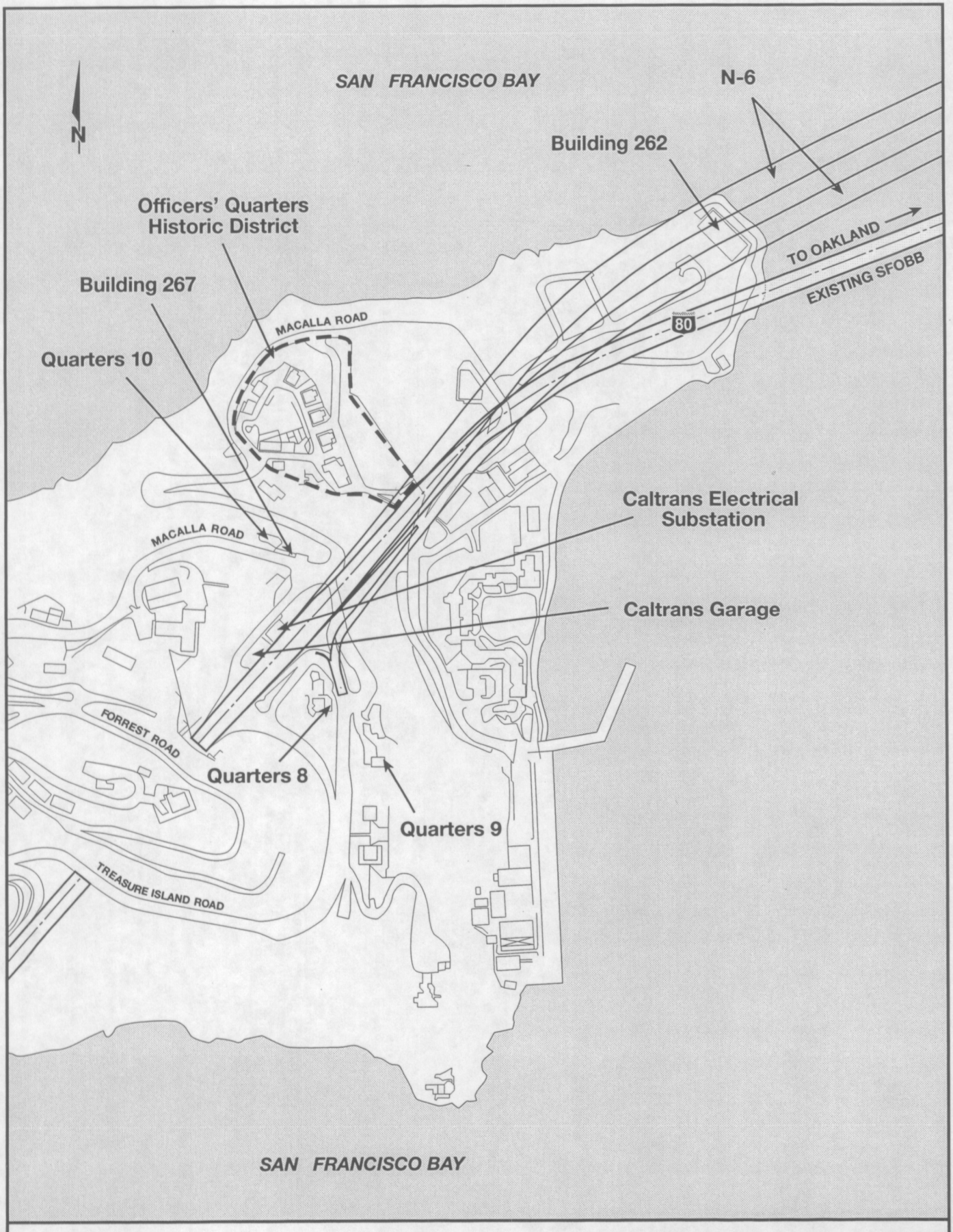


SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:5,000
0 100 200m

Historic Resources–Yerba Buena Island
N-2 Replacement Alternative
Figure 6-4

PBQ&D F-HYBI 9/15/98

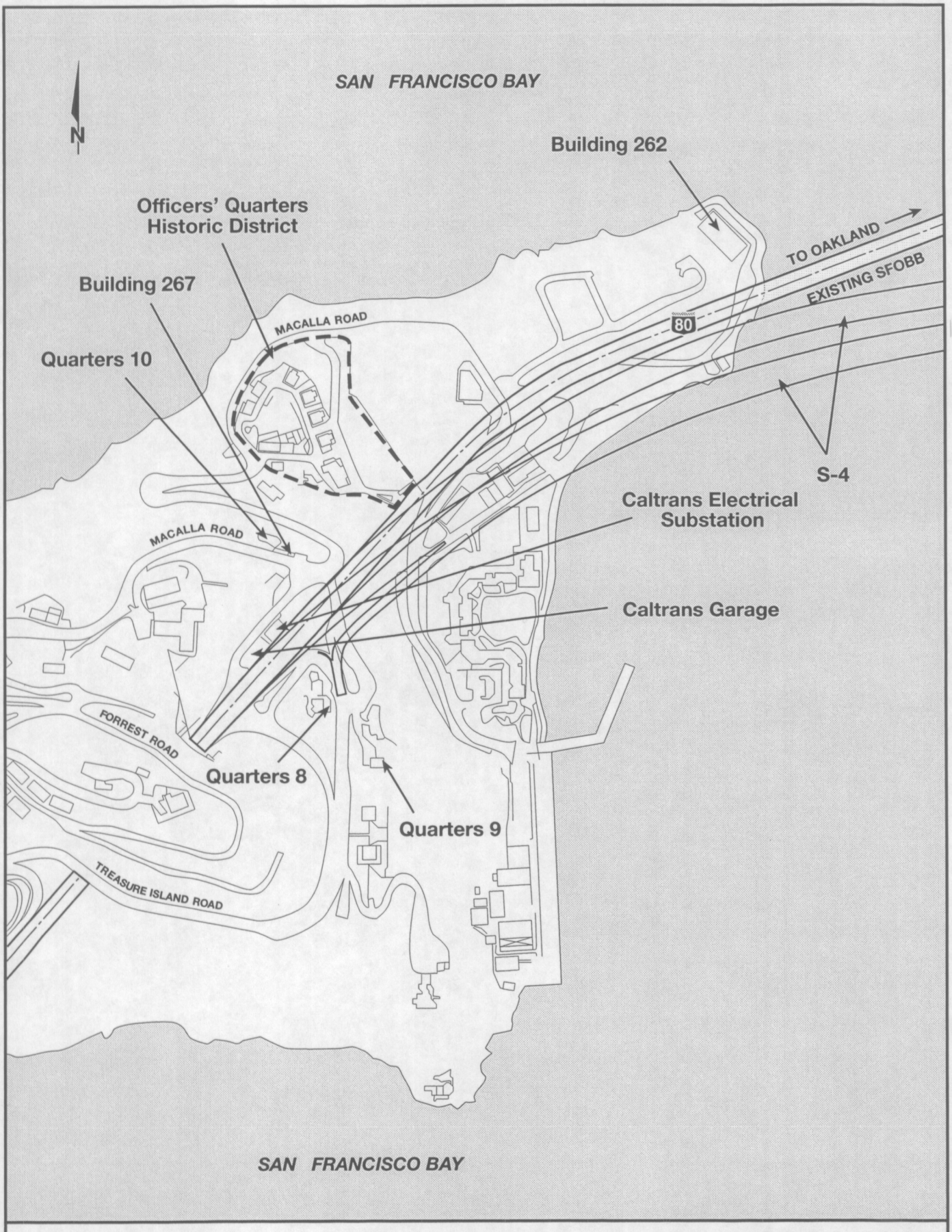


SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:5,000
0 100 200m

Historic Resources–Yerba Buena Island
N-6 Replacement Alternative
Figure 6-5

PBQ&D F-HYBI 9/15/98



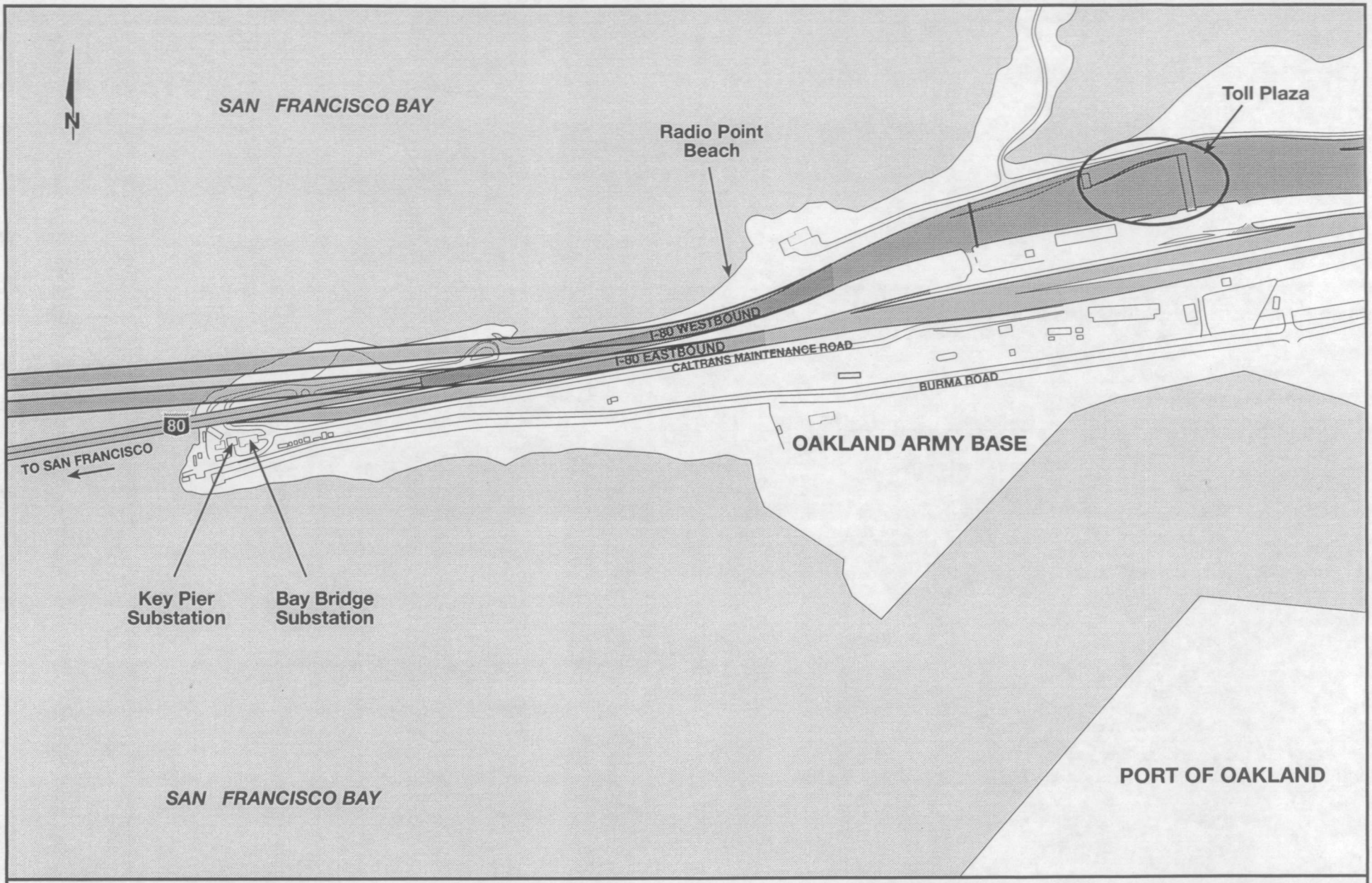
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:5,000

0 100 200m

Historic Resources–Yerba Buena Island
S-4 Replacement Alternative
Figure 6-6

PBQ&D F-HYBI 9/15/98



SFOBB EAST SPAN SEISMIC SAFETY PROJECT

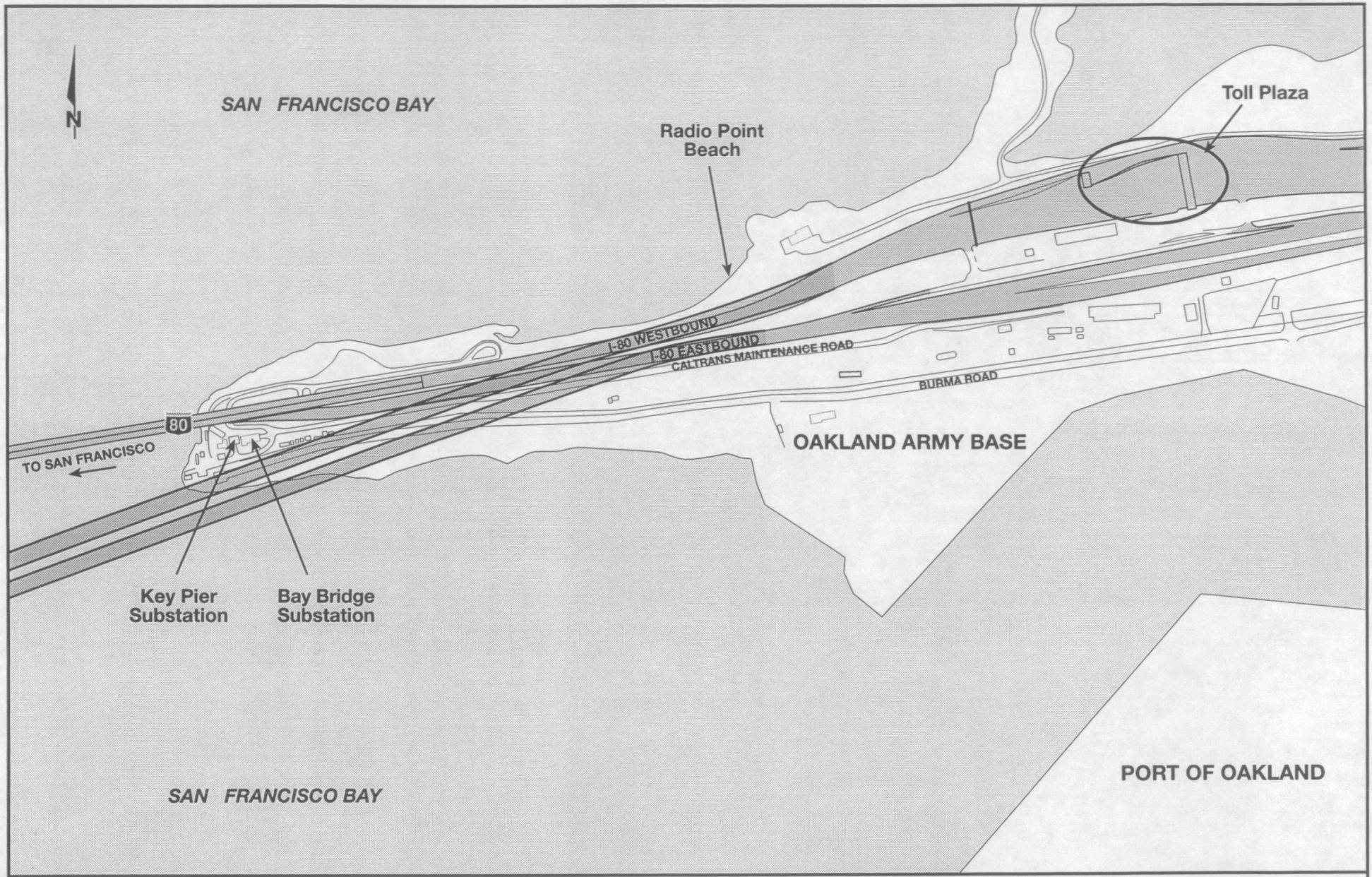
GRAPHIC SCALE 1:8,000

0 50 100 200 m

Historic Resources – Oakland Touchdown Area
North Replacement Alternatives

Figure 6-7

PDQ&D F-N6 IMP 9/10/98



SFOBB EAST SPAN SEISMIC SAFETY PROJECT

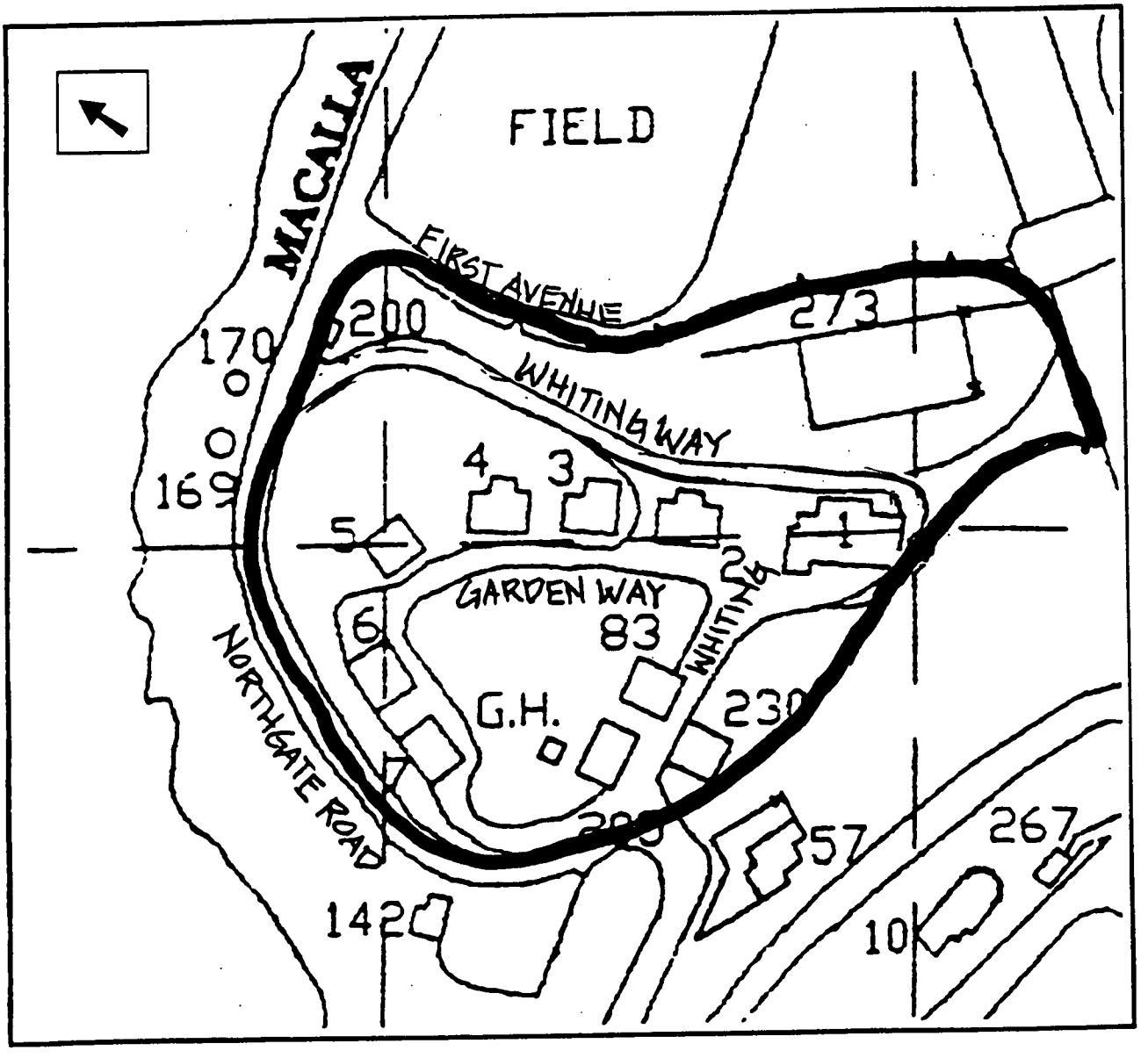
GRAPHIC SCALE 1:8,000
0 50 100 200 m

Historic Resources–Oakland Touchdown Area
S-4 Replacement Alternative

Figure 6-8

PDQ&D F-N6 IMP 9/10/98

APPENDIX B
LIST OF PREPARERS



Source: National Register of Historic Places nomination form – Senior Officers' Quarters Historic District, January 1997.

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Senior Officers' Quarters Historic District Boundary

Figure 6-9

APPENDIX B
LIST OF PREPARERS

Caltrans District 4 - Environmental Evaluation Team

Mara Melandry, Environmental Manager. M.Phil. Anthropology, B.A. Anthropology; 25 years experience in environmental planning with a specialty in historic preservation.

Annie Amundsen, Landscape Associate. M.L.A. Landscape Architecture; one year of experience in landscape architecture.

Debra Baker, Right of Way Planning and Management Project Coordination. B.S. Agricultural Economics and Management; 15 years of experience in the right of way field.

Allen Baradar, R.E.A., P.E., Senior Environmental Engineer. B.S. Metallurgical Engineering; six years in environmental engineering (hazardous waste, water quality, dredging, and regulatory compliance).

Dragomir Bogdanic, P.E., Transportation Engineer. M.S. Engineering; five years experience in water quality analysis.

Clive Endress, Landscape Associate. B.S. Landscape Architecture; 20 years experience in visual analysis.

Nick Fiorentinos, Right of Way Agent. B.A. Speech and Communication Studies; eight years of experience in performing right of way studies.

Michael Flake, P.E., Environmental Engineer. B.S. Civil Engineering; six years experience in environmental engineering, including water quality and hazardous waste analyses.

Andrew Hope, Associate Environmental Planner. M.A. Architecture; ten years experience in architectural history and historic preservation.

Bev McIntosh, Associate Biologist. M.A. Biogeography, B.A. Geography; 23 years practicing biology and teaching physical geography.

Marilee Mortenson, Associate Environmental Planner. B.S. Geology; seven years experience in environmental planning.

Rod Oto, Senior Transportation Engineer. B.S. Civil Engineering; 18 years experience in traffic operations.

Janet Pape, Associate Environmental Planner/Archaeologist. M.A. Cultural Resource Management; 17 years experience in California archaeology.

Don Stratton, Associate Right of Way Agent. B.S. Business; 18 years experience in right of way and performing housing/relocation studies.

Victor Zeuzem, Senior Environmental Engineer. A.A. Civil Engineering; 13 years in air quality, traffic noise, and energy analyses.

Parsons Brinckerhoff Quade & Douglas, Inc.

Ken Jong, P.E., Civil and Environmental Consultant Team Manager. B.S. Civil Engineering; 15 years experience in transportation engineering and project management.

Mike Davis, Environmental Manager. M.A. Urban and Regional Planning, B.A. Geography; 18 years experience in environmental and transportation planning.

Helise Cohn, Senior Transportation Planner. M.S. Civil Engineering (pending), B.S. Mathematics; nine years experience in transportation planning.

Jim Cunradi, Transportation Planner. M. City and Regional Planning, B.A. Urban Studies; seven years experience in transportation planning.

Timothy K. Dougherty, P.E., Civil Engineering Manager. B.S. Construction Engineering Technology; 20 years of highway engineering design and heavy construction experience.

Ivy Edmonds-Hess, Environmental Planner. B.S. Meteorology; nine years experience in environmental planning and air quality analysis.

Jeanine Foster, Environmental Attorney. J.D. Environmental Law, B.A. Distributive Studies; ten years experience in environmental and hazardous waste laws and regulations.

Jennifer Hannon, Civil Engineer. B.S. Civil Engineering; five years experience in civil/highway design.

Ross Maxwell, Lead Transportation Planner. M.S. Transportation Engineering, B.A. History; 25 years experience in transportation engineering.

Stephen Noack, Senior Environmental Planner. M.S. Urban and Regional Planning; 13 years experience in environmental planning.

Rita Poon, Administrative Assistant. B.A. Liberal Studies; 12 years experience.

Gabriel Rochè, Inc.

Michael Fajans, Senior Socioeconomic Specialist. M.A. City and Regional Planning, B.A. Urban Geography/Economics; 26 years experience in socioeconomic and transit analysis.

Janet Rochè, Principal Socioeconomic Specialist. B.A. Psychology; 26 years experience in socioeconomic analysis.

Pattillo & Garrett Associates

Christine Pattillo, Principal Landscape Architect. Masters in Landscape Architecture, B.A. Social Science; 23 years experience in providing landscape architectural services.

Christopher Kent, Landscape Architect. Masters in Landscape Architecture, B.A. Visual Design; 15 years experience in landscape and graphic design services.

Public Affairs Management

Mary Bean, Associate Planner. B.A. Environmental Studies/Planning; 10 years in environmental and community planning.

Surlene Grant, Senior Manager - Environmental Communications. M.A. Management, B.S. Journalism; 15 years experience in agency coordination and public involvement programs.

Danielle Hamilton, Senior Environmental Planner. M.A. City and Regional Planning, B.A. Environmental Studies/Planning; 10 years experience in the environmental planning and facilitation process.

Scott Steinwert, Principal Environmental Planner. B.A. Biology; 11 years experience in community and environmental planning.

Kay Wilson, President. M.A. Regional & Community Planning, B.A. Political Science; 29 years experience in community and environmental planning.

Steve Wertheim, Assistant Planner. B.A. Public Policy; two years experience in environmental planning and public involvement.

Woodward-Clyde Consultants

Jeff Zimmerman, Senior Environmental Planner. B.S. Conservation of Natural Resources; 18 years of experience in environmental planning.

Vance Bente, Senior Consultant. M.A. Anthropology; 24 years experience in cultural resources management.

Laura Cholodenko, Staff Biologist. B.A. Environmental Studies; three years experience in wildlife management and research.

Sean Dexter, Senior Staff Archaeologist. B.A. Anthropology; eight years of experience in cultural resource management/environmental planning.

Michael Greene, Assistant Project Scientist. B.S. Applied Mechanics; nine years of experience in acoustics and noise control engineering.

Robert Greene, Senior Project Scientist. B.S. Environmental Science; 22 years of experience in environmental noise and vibration.

Thomas Keegan, Senior Consultant. B.S. Fisheries; 17 years experience in fisheries biology.

Steve Kellogg, Associate Scientist. M.A. Biology, B.S. Biology; 25 years of experience in environmental impact statements and biological assessments.

Steve Leach, Wetlands Biologist. M.S. Botany, B.S. Geography; eight years of experience in biological assessments.

William Martin, Senior Water Quality Scientist. B.S. Oceanography; 13 years experience with biological impact assessments and water quality and marine resource issues.

Jennifer O'Connell, Senior Staff Biologist. B.S. Biology; five years of experience in biological evaluations.

APPENDIX C
DISTRIBUTION LIST

APPENDIX C
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ELECTED OFFICIALS

U.S. Senators

The Honorable Barbara Boxer
U.S. Senate
1700 Montgomery Street, Ste 240
San Francisco, CA 94111

The Honorable Dianne Feinstein
U.S. Senate
525 Market Street, Ste 3670
San Francisco, CA 94105

U.S. House of Representatives

The Honorable Tom Campbell
U.S. House of Representatives
910 Campisi Way, Suite 1C
Campbell, CA 95008

The Honorable Anna Eshoo
U.S. House of Representatives
698 Emerson Street
Palo Alto, CA 94301

The Honorable Vic Fazio
U.S. House of Representatives
722-B Main Street
Woodland, CA 95695

The Honorable Tom Lantos
U.S. House of Representatives
400 South El Camino Real, Suite 820
San Mateo, CA 94402

The Honorable Barbara Lee
U.S. House of Representatives
1301 Clay Street, Suite 1000N
Oakland, CA 94612

The Honorable George Miller
U.S. House of Representatives
367 Civic Drive, Suite 14
Pleasant Hill, CA 94523

The Honorable Nancy Pelosi
U.S. House of Representatives
450 Golden Gate Avenue,
Room 145380
San Francisco, CA 94102

The Honorable Frank Riggs
U.S. House of Representatives
1700 Second Street, Suite 378
Napa, CA 94559

The Honorable Fortney Pete Stark
U.S. House of Representatives
39300 Civic Center Drive, Suite 230
Fremont, CA 94538-2324

The Honorable Ellen Tauscher
U.S. House of Representatives
1801 North California Blvd., Suite 310
Walnut Creek, CA 94596

The Honorable Lynn Woolsey
U.S. House of Representatives
1101 College Ave., Suite 200
Santa Rosa, CA 95404-3952

California State Senate

The Honorable John Burton
California State Senate
601 Van Ness Ave., Ste 2030
San Francisco, CA 94102

The Honorable Maurice Johannessan
California State Senate
410 Hemsted Drive, Suite 200
Redding, CA 96002

The Honorable Quentin Kopp
California State Senate
363 El Camino Real, Suite 205
South San Francisco, CA 94080

The Honorable Bill Lockyer
California State Senate
22634 Second Street, Suite 104
Hayward, CA 94541

The Honorable Richard Rainey
California State Senate
1948 Mount Diablo Blvd.
Walnut Creek, CA 94596

The Honorable Mike Thompson
California State Senate
1040 Main Street, Suite 101
Napa, CA 94559

California State Assembly

Assemblymember Dion Aroner
California State Assembly
918 Parker Street
Berkeley, CA 94710

Assemblymember Valerie Brown
California State Assembly
50 D Street, #301
Santa Rosa, CA 95404

Assemblymember Lynne Leache
California State Assembly
800 South Broadway, Suite 304
Walnut Creek, CA 94596

Assemblymember Carole Migden
California State Assembly
1388 Sutter Street, Ste 710
San Francisco, CA 94109

Assemblymember Don Perata
California State Assembly
299 Third Street, Ste 100
Oakland, CA 94607

Assemblymember Helen Thomson
California State Assembly
555 Mason Street, Suite 275
Vacaville, CA 95688

Assemblymember Tom Torlakson
California State Assembly
815 Estudillo Street
Martinez, CA 94553

Alameda County Board of Supervisors

Mr. Scott Haggerty
Supervisor, District 1
Alameda County Board of Supervisors
1221 Oak Street, Room 536
Oakland, CA 94612

Ms. Gail Steele
Supervisor, District 2
Alameda County Board of Supervisors
1221 Oak Street, Room 536
Oakland, CA 94612

Ms. Wilma Chan
Supervisor, District 3
Alameda County Board of Supervisors
1221 Oak Street, Room 536
Oakland, CA 94612

Ms. Mary King
Supervisor, District 4
Alameda County Board of Supervisors
1221 Oak Street, Room 536
Oakland, CA 94612

Mr. Keith Carson
Supervisor, District 5
Alameda County Board of Supervisors
1221 Oak Street, Room 536
Oakland, CA 94612

Contra Costa County Board of Supervisors

Mr. Jim Rogers
Supervisor, District 1
Contra Costa County Board of Supervisors
100 37th Street, Room 270
Richmond, CA 94805

Ms. Gayle Uilkema
Supervisor, District 2
Contra Costa County Board of Supervisors
651 Pine Street, Room 108A
Martinez, CA 94553

Ms. Donna Gerber
Supervisor, District 3
Contra Costa County Board of Supervisors
309 Diablo Road
Danville, CA 94526

Mr. Mark DeSaulnier
Supervisor, District 4
Contra Costa County Board of Supervisors
2425 Bisso Lane, Suite 110
Concord, CA 94520

Mr. Joe Canciamilla
Supervisor, District 5
Contra Costa County Board of Supervisors
315 E. Leland Avenue
Pittsburg, CA 94565

City and County of San Francisco Board of Supervisors

Mr. Tom Ammiano
Member, Board of Supervisors
City and County of San Francisco
401 Van Ness Avenue, Room 308
San Francisco, CA 94102

Ms. Susan Bierman
Member, Board of Supervisors
City and County of San Francisco
401 Van Ness Avenue, Room 308
San Francisco, CA 94102

Mr. Amos Brown
Member, Board of Supervisors
City and County of San Francisco
401 Van Ness Avenue, Room 308
San Francisco, CA 94102

Ms. Leslie Katz
Member, Board of Supervisors
City and County of San Francisco
401 Van Ness Avenue, Room 308
San Francisco, CA 94102

Ms. Barbara Kaufman
President, Board of Supervisors
City and County of San Francisco
401 Van Ness Avenue, Room 308
San Francisco, CA 94102

Mr. Jose Medina
Member, Board of Supervisors
City and County of San Francisco
401 Van Ness Avenue, Room 308
San Francisco, CA 94102

Mr. Gavin Newsom
Member, Board of Supervisors
City and County of San Francisco
401 Van Ness Avenue, Room 308
San Francisco, CA 94102

Ms. Mabel Teng
Member, Board of Supervisors
City and County of San Francisco
401 Van Ness Avenue, Room 308
San Francisco, CA 94102

Mr. Michael Yaki
Member, Board of Supervisors
City and County of San Francisco
401 Van Ness Avenue, Room 308
San Francisco, CA 94102

Mr. Leland Yee
Member, Board of Supervisors
City and County of San Francisco
401 Van Ness Avenue, Room 308
San Francisco, CA 94102

Other County Boards of Supervisors

Mr. Marty Nichols
Clerk of the Marin County Board of Supervisors
3501 Civic Center Drive, #329
San Rafael, CA 94903

Ms. Mary Jean McLaughlin
Clerk of the Napa County Board of Supervisors
1195 Third Street, Room 310
Napa, CA 94559

Mr. Richard Silver
Clerk of the San Mateo County Board of Supervisors
County Government Center
401 Marshall Street, First Floor
Redwood City, CA 94063

Ms. Phyllis Perez
Clerk of the Santa Clara County Board of Supervisors
70 W Hedding Street, East Wing
San Jose, CA 95110

Other County Boards of Supervisors (continued)

Mr. Michael Johnson
Clerk of the Solano County Board of Supervisors
580 Texas Street
Fairfield, CA 94533

Ms. Lainey Gerber
Deputy Clerk of the Sonoma County Board of Supervisors
575 Administration Drive, #100-A
Santa Rosa, CA 95403

Mayors

The Honorable Ralph Appezzato
Mayor, City of Alameda
2263 Santa Clara Avenue, Suite 320
Alameda, CA 94501

The Honorable Elihu Harris
Mayor, City of Oakland
One City Hall Plaza, 3rd Floor
Oakland, CA 94612

The Honorable Shirley Dean
Mayor, City of Berkeley
2180 Milvia Street
Berkeley, CA 94704-1308

The Honorable Willie Brown
Mayor, City of San Francisco
401 Van Ness Avenue, 3rd Floor
San Francisco, CA 94102

The Honorable Ken Bukowski
Mayor, City of Emeryville
2200 Powell Street, 12th Floor
Emeryville, CA 94608

The Honorable James Spering
Mayor, City of Suisun City
501 Kings Way
Suisun City, CA 94585

Metropolitan Transportation Commission

The Honorable James Spering
MTC Chairperson
Mayor, City of Suisun City
501 Kings Way
Suisun City, CA 94585

Mr. James Beall, Jr
MTC Vice Chairperson
Santa Clara County Supervisor
70 West Hedding Street
San Jose, CA 95110

Ms. Mary King
MTC Bay Bridge Task Force Chairperson
Alameda County Supervisor
1221 Oak Street, Room 536
Oakland, CA 94612

Mr. Keith Axtell
MTC Commissioner
Director of Housing
U.S. Department of Housing and Urban Development
450 Golden Gate Avenue, Box 36003
San Francisco, CA 94102-3448

Ms. Jane Baker
MTC Commissioner
San Mateo County
1464 Woodberry Avenue
San Mateo, CA 94403

Ms. Sharon Brown
MTC Commissioner
City of San Pablo Councilmember
919 Road 20
San Pablo, CA 94806

Metropolitan Transportation Commission (continued)

Mr. Mark DeSaulnier
MTC Commissioner
Contra Costa County Supervisor
2425 Bisso Lane, Suite 110
Concord, CA 94520

Ms. Dorene Giacopini
MTC Commissioner
U.S. Department of Transportation
Joseph P. Bort Metro Center
101 Eighth Street
Oakland, CA 94607

Ms. Mary Griffin
MTC Commissioner
San Mateo County Supervisor
County Government Center
401 Marshall Street, First Floor
Redwood City, CA 94063

The Honorable Elihu Harris
MTC Commissioner
Mayor, City of Oakland
One City Hall Plaza, 3rd Floor
Oakland, CA 94612

Mr. Tom Hsieh
MTC Commissioner
City and County of San Francisco
1151 Taylor Street
San Francisco, CA 94108

Mr. Stephen Kinsey
MTC Commissioner
Marin County Supervisor
3501 Civic Center Drive, Suite 329
San Rafael, CA 94903-4193

Ms. Jean McCown
MTC Commissioner
City of Palo Alto Councilmember
527 Seale Avenue
Palo Alto, CA 94301

Ms. Charlotte Powers
MTC Commissioner
City of San Jose Councilmember
801 North First Street, Room 600
San Jose, CA 95110

Mr. Jon Rubin
MTC Commissioner
Bay Relations, Inc.
Suite 280
2171 Junipero Serra Boulevard
Daly City, CA 94014

Mr. Angelo Siracusa
MTC Commissioner
San Francisco Bay Conservation and
Development Commission
213 Stanford Avenue
Mill Valley, CA 94941

Ms. Kathryn Winter
MTC Commissioner
Napa County Supervisor
1195 Third Street, Room 310
Napa, CA 94559-3082

Ms. Sharon Wright
MTC Commissioner
Mayor, City of Santa Rosa
631 First Street
Santa Rosa, CA 95404

FEDERAL AGENCIES

Mr. Calvin Fong
Attn: Ms. Victoria Alvarez
U.S. Army Corps of Engineers
San Francisco District
CESPN-CO-R
333 Market Street, 8th Floor
San Francisco, CA 94105-2197

Centers for Disease Control
Center for Environmental Health
and Injury Control
Special Programs Group-
Mail Stop F-29
1600 Clifton Road
Atlanta, GA 30333

Mr. Wayne Till
Chief Bridge Section
U.S. Coast Guard
Coast Guard Island
Building 10, Room 214
Alameda, CA 94501-5100

Commander, MLCPAC (se)
Attn: Ms. Carol Meyer
Building 54-D, Coast Guard Island
Alameda, CA 94501-5100

Mr. Leo Lozano
Planning, Commander MLCP (sp)
U.S. Coast Guard
Building 54D
Coast Guard Island
Alameda, CA 94501-5100

Mr. John Milkey
Engineering Officer
USCG Group San Francisco
Yerba Buena Island
San Francisco, CA 94130-5013

Mr. Tom Galvin, BRAC Coordinator
U.S. Department of Defense
Oakland Army Base
100 Alaska Street, Ste 2214
Oakland, CA 94626-2214

Director
Office of Environmental Compliance
U.S. Department of Energy
1000 Independence Avenue, S.W.
Room 4G-064
Washington, D.C. 20585

U.S. Environmental Protection Agency
Office of Federal Activities,
Mail Code 2252-A
EIS Filing Section
401 M Street, S.W.
Washington, D.C. 20460

U.S. Environmental Protection Agency
Region IX
Federal Activities Office CMD-2
75 Hawthorne Street
San Francisco, CA 94105-3901

Mr. Mark Bartholomew
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105

Chief, Airports Branch
Federal Aviation Administration
831 Mitten Road
Burlingame, CA 94010

Regional Director
Federal Emergency Management
Agency
Region IX, Building 105
The Presidio, CA 94129

Federal Agencies (continued)

Mr. Robert Hom
Attn: Ms. Donna Turci
Federal Transit Administration
Region IX
201 Mission Street, Suite 2210
San Francisco, CA 94105

Mr. Joel Medlin
Attn: Jerry Bielfeldt
Sacramento Fish & Wildlife Office
U.S. Fish and Wildlife Service
3310 El Camino Avenue, Suite 130
Sacramento, CA 95821-6340

Director
Office of Environmental Affairs
Department of Health and Human Services
200 Independence Avenue SW
Room 537F
Washington D.C. 20201

Environmental Clearance Officer
Department of Housing and Urban Development
450 Golden Gate, P.O. Box 36003
San Francisco, CA 94102

Director, Office of Environmental Policy and Compliance
U.S. Department of the Interior
Main Interior Building, MS 2340
1849 C Street, NW
Washington, D.C. 20240

Ms. Irma Lagomarsino
National Marine Fisheries Service
SW Region
501 W. Ocean Blvd., Suite 4200
Long Beach CA 90802-4213

Mr. Dan Cheng
Environmental Assessment Branch
National Marine Fisheries Service
777 Sonoma Ave., Room 325
Santa Rosa, CA 95404

Mr. Chris Mobley
Environmental Assessment Branch
National Marine Fisheries Service
777 Sonoma Ave., Room 325
Santa Rosa, CA 95404

Mr. Gary Munsterman
National Park Service
Pacific Great Basin System Support Office
600 Harrison Street, Suite 600
San Francisco, CA 94107-1372

U.S. Natural Resources Conservation Service
Area Conservationist, Area II
318 Cayuga Street, Ste 206
Salinas, CA 93901

Commander Ernest Hunter
Engineering Field Activity West
Naval Facilities Engineering Command
U.S. Department of the Navy
900 Commodore Drive
San Bruno, CA 94066-2402

Mr. John Parsons
Utility Specialist
Engineering Field Activity West
Naval Facilities Engineering Command
U.S. Department of the Navy
900 Commodore Drive
San Bruno, CA 94066-5006

Federal Agencies (continued)

Mr. Kenn Parsons
Base Conversion Manager
Engineering Field Activity West
Naval Facilities Engineering Command
U.S. Department of the Navy
900 Commodore Drive
San Bruno, CA 94066-5006

Mr. Bob Clarke
CSO Treasure Island
U.S. Navy
Building 1 Treasure Island
San Francisco, CA 94130

STATE AGENCIES

State Clearinghouse
1400 Tenth Street, Room 121
Sacramento, CA 95814

The Clearinghouse will distribute to the following agencies:

Department of Boating and Waterways
Department of Conservation
Department of Fish and Game
Department of Health Services
Department of Water Resources
California Coastal Commission
California Highway Patrol
Native American Heritage Commission
Resources Agency
State Air Resources Board
State Coastal Conservancy
State Historic Preservation Officer
State Lands Commission
State Water Resources Control Board

REGIONAL/LOCAL AGENCIES AND ORGANIZATIONS RECEIVING A COPY OF THE DOCUMENT

Ms. Sharon Banks
General Manager
Alameda-Contra Costa Transit District
1600 Franklin Street
Oakland, CA 94612

Mr. Dennis Fay
Executive Director
Alameda County Congestion
Management Agency
1333 Broadway, Suite 220
Oakland, CA 94612

Mr. Mike Veasey
American Telephone and Telegraph
1431 N. Market Blvd, Ste 9
Sacramento, CA 95834-1942

Mr. Eugene Leong, Executive Director
Association of Bay Area Governments
Metrocenter
P.O. Box 2050
Oakland, CA 94604

Mr. Gary Binger
Planning Director
Association of Bay Area Governments
Metrocenter, P.O. Box 2050
Oakland, CA 94604

Mr. Richard Napier
Executive Director
City/County Association of
Governments of San Mateo County
10 Twin Dolphin Drive, Suite C-200
Redwood City, CA 94065-1065

Ms. Ellen Garvey
Air Pollution Control Officer
Bay Area Air Quality Management
District
939 Ellis Street
San Francisco, CA 94109

Mr. Russell Hancock
Vice President for Growth Management
Bay Area Council
200 Pine Street, Ste 300
San Francisco, CA 94104

Ms. Mandy Clayton
Bay Area Council
200 Pine Street, Ste 300
San Francisco, CA 94104

Mr. Thomas Margro
General Manager
Bay Area Rapid Transit District
800 Madison Street, P.O. Box 12688
Oakland, CA 94604-2688

Mr. Robert Jacobvitz
Executive Director
Bay Bridge Coalition
130 Sutter Street, Suite 1600
San Francisco, CA 94104

Mr. Kin Ho
California Highway Patrol
111 Grand Avenue
Oakland, CA 94612

Mr. Robert McCleary
Executive Director
Contra Costa Transportation Authority
1340 Treat Boulevard, Suite 150
Walnut Creek, CA 94596

Mr. Brad Olson
Acting Manager, Advanced Planning
East Bay Regional Park District
P.O. Box 5381
Oakland, CA 94605-0381

Mr. Jimi Yoloye
Supervisor of Wastewater Planning
East Bay Municipal Utility District
375 Eleventh Street, MS 702
Oakland, CA 94607-4240

Regional/Local Agencies and Organizations
Receiving a Copy of the Document (continued)

Mr. Pat Clinton
Supervisor of Distribution Systems Engineering
East Bay Municipal Utility District
375 Eleventh Street, MS 502
Oakland, CA 94607-4240

Mr. Steve Vettel
Gladstow & Vettel
177 Post Street
San Francisco, CA 94108

Mr. H. Paul Friesema
Institute of Policy Research
Northwestern University
2040 Sheridan Road
Evanston, IL 60208-4100

Ms. Helaine Kaplan Prentice
Zoning Division
Landmarks Preservation Board
1330 Broadway, 2nd Floor
Oakland, CA 94612

Mr. Farhad Mansourian
Marin County Congestion Management Agency
P.O. Box 4186
San Rafael, CA 94913-4186

Mr. Joseph Nicoletti
MTC Bay Bridge Design Task Force
Engineering and Design Advisory Panel
Chairperson
Metrocenter
P.O. Box 2050
Oakland, CA 94604

Mr. Michael White
OSP Engineering
MCI Telecommunications Corporation
2270 Lakeside Boulevard
Richardson, TX 75082

Mr. John Ponte
Manager
Napa County Congestion Management Agency
1195 Third Street, Room 201
Napa, CA 94559-3092

Ms. Marina Carlson
Mayor's Office
City of Oakland
One City Hall Plaza, 3rd Floor
Oakland, CA 94612

Mr. Charles Bryant
Planning Manager
Office of Community & Economic Development
1330 Broadway, 2nd Floor
Oakland, CA 94612

Mr. Terry Roberts
Director of Public Works
City of Oakland
1333 Broadway, 8th Floor
Oakland, CA 94612

Ms. Diane Tannenwald
Public Works Agency
City of Oakland
250 F. H. Ogawa Plaza, Suite 4314
Oakland, CA 94612

Mr. Andrew Altman
Chief of Strategic Planning
City of Oakland
250 F. H. Ogawa Plaza, Suite 3330
Oakland, CA 94612

Mr. Paul Nahm
Executive Director
Oakland Base Reuse Authority
1333 Broadway, 9th Floor
Oakland, CA 94612

Regional/Local Agencies and Organizations
Receiving a Copy of the Document (continued)

Mr. George Childs
Public Works Coordinator
Pacific Bell
2410 Camino Ramon, Room 350 O
San Ramon, CA 94583

Mr. Randy Burton
Senior Land Technician
Pacific Gas and Electric Company
1317 Detroit Avenue
Concord, CA 94518-2487

Mr. Tom Glover
Port of Oakland
530 Water Street
Oakland, CA 94103

Ms. Anne Whittington
Port of Oakland
530 Water Street
Oakland, CA 94607

Mr. Rick Wiederhorn
Port of Oakland
530 Water Street
Oakland, CA 94607

Ms. Cathy Wasikowski
Executive Director
RIDES for Bay Area Commuters
1330 Broadway, Suite 601
Oakland, CA 94612

Mr. Brett Muscik
Project Engineer
Ross G. Stephenson Associates, Inc.
2801 Coffee Rd Suite B-1
Modesto, CA 95355

Ms. Annemarie Conroy
Executive Director
Mayor's Treasure Island Project Office
City and County of San Francisco
401 Palm Avenue
Building #1, Room 229
Treasure Island,
San Francisco, CA 94130

Mr. Stuart Sunshine
Director of Parking and Traffic
City of San Francisco
25 Van Ness Avenue, Ste 410
San Francisco, CA 94102

Mr. Gerald Green
Director of Planning
City of San Francisco
1660 Mission Street, 5th Floor
San Francisco, CA 94103

Ms. Suzana Montaña
Planning Department
City of San Francisco
1660 Mission Street, 5th Floor
San Francisco, CA 94103

Ms. Hillary Gitelman
City Environmental Office
City and County of San Francisco
1660 Mission Street
San Francisco, CA 94103

Mr. Mark Primeau
Director of Public Works
City of San Francisco
875 Stevenson Street, Room 410
San Francisco, CA 94103

Mr. Steve McAdam
Deputy Executive Director
San Francisco Bay Conservation
and Development Commission
30 Van Ness Avenue, Suite 2011
San Francisco, CA 94102-6080

Regional/Local Agencies and Organizations Receiving a Copy of the Document (continued)

Mr. Will Travis
San Francisco Bay Conservation and Development Commission
30 Van Ness Avenue
San Francisco, CA 94102

Ms. Victoria Eisen
San Francisco Bay Trail Project
Metrocenter, P.O. Box 2050
Oakland, CA 94604

Ms. Carmen Clark
Executive Director
San Francisco County Transportation Authority
100 Van Ness Avenue, 25th Floor
San Francisco, CA 94102

Mr. Jim Chapell
Executive Director
San Francisco Planning & Urban Research Association
312 Sutter Street, Suite 500
San Francisco, CA 94108-4305

Mr. Jeff Murray
Superintendent of Buildings and Grounds
San Francisco Water Department
1990 Newcomb Avenue
San Francisco, CA 94124

Mr. Michael Evanhoe
Congestion Management Program Director
Santa Clara Valley Transportation Authority
3331 North First Street
San Jose, CA 95134-1906

Mr. Marty Tuttle
Executive Director
Solano Transportation Authority
333 Sunset Avenue, Suite 200
Suisun City, CA 94585

Ms. Suzanne Wilford
Executive Director
Sonoma County Transportation Authority
2550 Ventura Avenue
Santa Rosa, CA 95403

Mr. Tim Szala
Eastern Area Fiber Security
Western Union ATS
7000 Weston Parkway
Cary, NC 27513

NOTICE OF AVAILABILITY

Notice of availability of the Draft Environmental Impact Statement and the corresponding technical reports will be mailed to members of the East Span Project newsletter mailing list. This mailing list consists of approximately 3,500 interested parties.

APPENDIX D
DEFINITIONS AND ACRONYMS

APPENDIX D
DEFINITIONS AND ACRONYMS

DEFINITIONS

Abutment - A stone, concrete, brick, or timber structure supporting the end of a span.

Advisory Council on Historic Preservation (ACHP) - An independent federal agency that provides a forum for influencing federal policy, programs, and activities as they affect historic and archaeological resources in communities and on public lands nationwide.

Alluvium - Deposits resulting from the operations of water, including floodplains, lakes, rivers, and fans at the foot of mountain slopes.

Anchorage - An assemblage of material designed to hold in correct position the anchor span of a cantilever bridge or the end of a suspension span cable.

Attainment area - An area that meets air quality standards.

Attenuation - The reduction of sound.

Bay Area Regional Water Quality Control Board (RWQCB) - An agency with the California Environmental Protection Agency that is responsible for regulating pollutants to protect the water resources of the Bay Area.

Bay mud - soft to stiff silty clay with some shell fragments that is found in the Bay. It is generally unsuitable for structure foundations.

Bedrock - Solid rock that underlies all soil, sand, clay, gravel, and loose material on the earth's surface.

Bent - A bridge support column founded on land.

Borrow - Earth brought in from another location to be used as fill material.

Bracing - A system of tension or compression member that supports a truss or frame.

Cable - The part of a bridge that has the function of receiving the bridge floor loads and transmitting them to the towers and the anchorages.

Cable-stayed span - A span that involves steel cables that connect towers directly to support the bridge deck.

California Department of Fish and Game (CDFG) - The state agency that manages California's fish, wildlife, and plant resources.

Candidate species - Any species of fish, wildlife, or plant which has been determined to be candidate for listing under Section 4 of the Endangered Species Act of 1973 (amended).

Cantilever span - A general term applying to a bridge having a superstructure of the cantilever type (supported at one end only).

Cofferdam - A temporary water-tight enclosure built in the water and pumped dry to expose the bottom so that construction of piers can be undertaken.

Column - A supporting pillar.

Contaminant source - A facility that treats, stores, or disposes of hazardous waste, uses hazardous substances, or stores petroleum products on site.

Cultural resources - Archaeological and historic resources eligible for or listed on the National Register of Historic Places that could potentially be affected by a given project. Cultural resources include buildings, sites, districts, structures, or objects having historical, architectural, archaeological, cultural, or scientific importance.

Cumulative impact - The impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.

Day-Night Equivalent Sound Level (Ldn) - A 24-hour equivalent sound level with a 10 dB penalty assessed to noise events occurring at night (10:00 p.m. to 7:00 a.m.).

dBA - A sound level in decibels, measured with a sound level meter having metering characteristics and frequency weighting specified in American National Standard Specifications for sound level meters ANSI S1.4-1971. It is common to refer to numerical units of an A-weighted sound level as "dBA."

Deck - The portion of a bridge which provides direct support for vehicular and pedestrian traffic.

Draft Environmental Impact Statement (DEIS) - A draft report that analyzes potential environmental effects of a proposed project in compliance with NEPA.

Dredged Material Management Office (DMMO) - An interagency coordination group, consisting of the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the San Francisco Bay Conservation and Development Commission, and the Regional Water Quality Control Board, that determines the eligibility of in-Bay disposal for dredged materials.

Edge truss -Horizontal trusswork that is extended from the base of a lower deck to the bottom of an upper deck.

Endangered species - Any species of fish, wildlife, or plant which has been determined to be endangered under Section 4 of the Endangered Species Act of 1973 (amended). This definition is adopted from the USFWS, Section 7 regulations, 51 FR 19926.

Equivalent Sound Level (L_{eq}) - A measure of sound energy over a period of time, or a sound level which, in a stated period of time, would contain the same acoustical energy as the time-varying sound during the same period.

Expansion joint - A joint designed to provide means for expansion and contraction movements produced by temperature changes, loadings, or other means.

4 (f) resources - Public park and recreation lands, wildlife and waterfowl refuges, and historic sites.

Falsework - A temporary wooden or metal framework built to support without appreciable settlement and deformation the weight of a structure during the period of its construction.

Federal Transit Administration (FTA) - The federal agency that provides financial and technical assistance to local transit systems. It also assists in the development of local and regional traffic reduction programs.

Fill - Earth used to create embankments or to raise low-lying areas in order to bring them to grade.

Final Environmental Impact Statement (FEIS) - A report that analyzes potential environmental effects of an identified preferred alternative and responds to comments received on the DEIS.

Floodplain - The part of the ground surface inundated with water on a recurring basis, usually associated with the one percent recurrence interval (100-year) flow.

Footing - The enlarged, or spread-out, lower portion of a substructure, which distributes the structure load either to the earth or to supporting piles.

Foundation - The supporting material upon which the substructure portion of a bridge is placed.

Franciscan Formation - Bedrock that is approximately 90 to 160 million years old. It is composed of sandstone and shale and is generally highly weathered.

General plan - A document that contains policies and action for implementation of the goals of a community.

Geomorphic - Of the Earth's surface configuration.

Girder - A horizontal beam used as a main support for a structure.

Grade - A slope or gradual incline.

Groundwater - Water beneath the earth's surface between saturated soil and rock that supplies wells and springs.

Haunched girder - An arched beam used between support piers.

High Occupancy Vehicle (HOV) - A "carpool" or vehicle occupied by two or more persons.

High Occupancy Vehicle Lane. (HOV Lane) - A system of exclusive lanes signed and striped for use by vehicles with multiple occupants (two or more persons) or ridership. HOV lanes are designed on roadways to reduce traffic congestion, improve safety, reduce fuel consumption, and improve air quality.

Inundation - The act of covering with water.

Isolator bearing - A bearing developed to protect structures against earthquake damage. Under seismic loading, the bearing becomes more flexible and allows it to isolate the bridge from the effects of earthquake motion.

Landscape unit - A geographically distinct portion of an area that has a particular visual character.

Lateral bracing - The horizontal bracing assemblage engaging the inclined end posts of truss and the flanges of plate girders. Its function is to help the structure resist wind, lateral vibration, and traffic movement tending to produce lateral movement and deformation.

Lattice work - A structure made of lattices that is used to secure another structure in place.

Level of Service (LOS) - The operating level of an intersection or roadway segment can be described using the term Level of Service. Level of Service is a qualitative description of operation based on delay and maneuverability. It can range from "A" representing free flow conditions to "F" representing gridlock.

Lifeline - A connection that 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.

Maintenance area - An area that had previously been designated a non-attainment area, but now meets applicable air quality standards.

Maximum Credible Earthquake (MCE) - The largest earthquake reasonably capable of occurring based on current geological knowledge.

Metamorphic - Pertaining to an alternation in composition, texture, or structure of rock masses caused by great heat of pressure.

Metropolitan Transportation Commission (MTC) - The transportation planning, coordinating, and financing agency for the nine-county San Francisco Bay Area. It functions both as the region's metropolitan transportation planning agency (RTPA) and as the region's metropolitan planning organization (MPO)—state and federal designations, respectively.

Mitigation - Measures taken to minimize adverse environmental impacts. Mitigation could reduce the magnitude and extent of an impact from a level of significance to a level of insignificance.

National Environmental Policy Act (NEPA) - The United States' basic national charter for protection of the environment. It establishes policy, sets goals, and provides means for carrying out the policy.

National Historic Preservation Act of 1966 - The primary federal law pertaining to protection of cultural resources, referred to as Section 106.

National Marine Fisheries Service (NMFS) - The part of the National Oceanic and Atmospheric Administration that oversees the Administration's programs which support the domestic and international conservation and management of living marine resources.

National Register eligible - Cultural resources eligible for inclusion on the National Register of Historic Places.

National Register of Historic Places - A federal listing of historic resources protected under the National Historic Preservation Act of 1966.

Navigation channel - The area of water used for marine vessel travel.

Non-attainment area - An area that does not meet air quality standards.

Noise Abatement Criteria - Noise level standards above which noise reducing actions should be considered.

Outfall - The place where a sewer, drain, or stream discharges.

Pier - A structure composed of stone, concrete, brick, steel or wood and built in shaft or block-like form to support the ends of the spans of a multi-span superstructure at an intermediate location between its abutments.

Pile - A heavy beam driven into the earth as a foundation or support for a structure.

Pile cap - The topmost portion of a pier. On rigid frame piers, the term applies to the beam across the column tops.

Portal - The clear unobstructed space of a through bridge forming the entrance to the structure.

Right-of-way - Land dedicated to the transportation facility.

Riparian - An aquatic or terrestrial ecosystem that is associated with bodies of water, such as streams, lakes, or wetlands, or is dependent upon the existence of perennial, intermittent, or ephemeral surface or subsurface water drainage. Riparian areas are usually characterized by dense vegetation and an abundance and diversity of wildlife.

Riprap - Brickbats, stones, blocks of concrete or other materials deposited upon shores to prevent erosion and scour by water flow.

San Francisco Bay Conservation and Development Commission (BCDC) - The state agency responsible for preventing the unnecessary filling of the San Francisco Bay and for increasing public access to and along the Bay shoreline. The BCDC is also the federally designated state coastal management agency for the San Francisco Bay segment of the California coastal zone authorized under the federal Coastal Zone Management Act.

Self-anchored suspension bridge - A suspension bridge where cables are anchored in the bridge deck itself, eliminating the need for traditional anchorage structures.

Shoal - A place in a body of water where the water is particularly shallow.

Silt - A sedimentary material consisting of fine mineral particles in size between sand and clay.

Skyway span - A span that is supported from under the bridge deck by piers.

Special status species - Any species of fish, wildlife, or plant that is officially listed as rare, threatened, or endangered or candidate for rare, threatened, or endangered species listing under the state or federal Endangered Species Acts.

Spit - A narrow point of land extending into a body of water.

State Implementation Plan (SIP) - A plan for attaining national ambient air quality standards required by the Clean Air Act.

State Office of Historic Preservation - The state agency that assists private citizens, private institutions, local governments, and state and federal agencies in the identification, evaluation, protection, and enhancement of properties significant in California history and archaeology; also responsible for reviewing federal undertakings that affect cultural resources on or eligible for the National Register of Historic Places.

Stress - An applied force or system of forces that tends to strain or deform a body.

Substructure - The abutments, piers, grillage or other constructions built to support the span or spans of a bridge.

Superelevation - The transverse inclination of the roadway surface within a horizontal curve. The purpose of superelevation is to provide a means of resisting or overcoming the centrifugal forces of vehicles in transit.

Superstructure - The entire portion of the bridge structure which primarily receives and supports highway, railway or other traffic loads.

Surface runoff - Water that runs off of streets and land and enters a body of water.

Suspension bridge - A span where cables are draped from towers and connected to anchorages on either side of the bridge.

Tectonic - Pertaining to structural deformations in the earth's surface.

Tower - A pier or frame serving to support the cables of a bridge at the end of a span.

Transportation Demand Management (TDM) - Strategies or techniques to decrease single occupant vehicle traffic on streets by encouraging the use of carpools, transit ridership, bicycle travel, and telecommuting.

Transportation Management Plan - A plan to manage traffic during construction of projects to reduce congestion.

Transportation System Management (TSM) - Strategies or techniques to increase the capacity of a transportation system through relatively low-cost improvements.

Trestle - A framework consisting of vertical, slanted supports and horizontal crosspieces supporting a bridge.

Truss - A jointed structure having an open built web construction so arranged that the frame is divided into a series of triangular figures.

Tsunamis - Seismically induced sea waves that are generated when large subsea earth or rock masses are displaced during earthquakes or very large landslides.

U.S. Army Corps of Engineers (ACOE) - Federal agency with jurisdiction over waters of the U.S.

U.S. Environmental Protection Agency (EPA) - The federal agency responsible for maintaining environmental quality, including air quality, noise, and hazardous waste management.

U.S. Fish and Wildlife Service (USFWS) - The federal agency that administers the federal Endangered Species Act and is involved in protection of fish and wildlife habitat, including wetland areas.

Viaduct - A series of spans or arches used to carry a road or railroad over a wide valley or over other roads or railroads.

Visual dominance - The contrast between a project and their setting described in terms of vegetation, landform, and structural changes.

Visual image type - An area that exhibits a fairly homogeneous visual quality. Types that are present in the SFOBB study area include recreational, industrial, institutional/military, historical, and open space.

Watershed - That part of the earth's surface from which storm water runoff flows to a single point.

Waterway - The available width for the passage of water beneath a bridge.

Wetlands - According to regulations of the U.S. Army Corps of Engineers, wetlands are areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, under normal conditions, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, and similar areas and are subject to protection under Executive Order 11990 and Section 404 of the Clean Water Act.

ACRONYMS

AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ABAG	Association of Bay Area Governments
AC Transit	Alameda-Contra Costa Transit District
ACHP	Advisory Council on Historic Preservation
ACOE	U.S. Army Corps of Engineers
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
APE	Area of Potential Effect
APCD	Air Pollution Control District
AQMD	Air Quality Management District
ASR	Archaeological Survey Report
BAAQMD	Bay Area Air Quality Management District
BART	Bay Area Rapid Transit District
BCDC	San Francisco Bay Conservation and Development Commission
BEQ	Bachelors Enlisted Quarters
BMPs	Best Management Practices
BRAC	Base Reuse and Closure
Btu	British thermal unit
CAA	Federal Clean Air Act
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CCAA	California Clean Air Act
CCSF	City and County of San Francisco
CDFG	California Department of Fish and Game
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CHP	California Highway Patrol
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Survey
CO	Carbon Monoxide
CSHC	California Streets and Highways Code
CZMA	Coastal Zone Management Act
dB	Decibel
dBA	A-weighted decibel
dBA Leq	A-weighted decibel equivalent sound level
DEIS	Draft Environmental Impact Statement
DHS	State of California Department of Health Services
DMMO	Dredged Material Management Office
DOD	Department of Defense
DTSC	California Department of Toxic Substance Control
EBMUD	East Bay Municipal Utility District

EBRPD	East Bay Regional Park District
EDAP	MTC Bay Bridge Design Task Force Engineering and Design Advisory Panel
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESU	Evolutionary Significant Unit
FAA	Federal Aviation Administration
FCWA	Federal Clean Water Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FISC	Fleet and Industrial Supply Center
ft	Foot or feet
FTA	Federal Transit Administration
FWPCA	Federal Water Pollution Control Act
ha	Hectare or hectares
HABS	Historic American Building Survey
HAER	Historic American Engineering Record
HASR	Historic Architecture Survey Report
HOV	High Occupancy Vehicle
HPSR	Historic Properties Survey Report
HUD	Department of Housing and Urban Development
HWIS	Hazardous Waste Information System
I-80	Interstate 80
IR	Installation Restoration
IRP	Installation Restoration Program
ISA	Initial Site Assessment
km	Kilometer or kilometers
L_{eq}	Equivalent Sound Level
LRT	Light Rail Transit
LTMS	Long-Term Management Strategy
LUST	Leaking Underground Storage Tank
m	Meter or meters
MCE	Maximum Credible Earthquake
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPN	Most Probable Number
MPO	Metropolitan Planning Organization
MSL	Mean Sea Level
MTC	Metropolitan Transportation Commission
MUNI	San Francisco Municipal Railway
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
NAVSTA-TI	Naval Station Treasure Island
NEPA	National Environmental Policy Act
NES/BA	Natural Environment Study and Biological Assessment
NGVD	National Geodetic Vertical Datum

NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NO_x	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWP	Nationwide Permit
O_3	Ozone
OARB	Oakland Army Base
OBRA	Oakland Army Base Reuse Authority
OES	Office of Emergency Services
PAH	Polyaromatic Hydrocarbon
PA/SI	Preliminary Assessment/Site Investigation
Pb	Lead
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
PCM	Permanent Control Measures
PDT	Project Development Team
PG&E	Pacific Gas and Electric Company
$PM_{2.5}$	Particulate Matter with an Aerodynamic Diameter less than 2.5 Micrometers
PM_{10}	Particulate Matter with an Aerodynamic Diameter less than Ten Micrometers
PPE	Personal Protective Equipment
ppm	Parts per Million
PSI	Preliminary Site Investigation
ROD	Record of Decision
RCRA	Resource Conservation and Recovery Act
RMP	Regional Monitoring Program
RTIP	Regional Transportation Improvement Program
RTP	Regional Transportation Plan
RWQCB	Bay Area Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act
SCPBRG	Santa Cruz Predatory Bird Research Group
SDWA	Safe Drinking Water Act
SF	San Francisco
SFEI	San Francisco Estuary Institute
SFFD	San Francisco Fire Department
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SFOBB	San Francisco-Oakland Bay Bridge
SFWD	San Francisco Water Department
SO_2	Sulfur Dioxides
SVOC	Semi-Volatile Organic Compound
SWPPP	Storm Water Pollution Prevention Plan
TI	Treasure Island
TIDRP	Treasure Island Draft Reuse Plan
TIHDI	Treasure Island Homeless Development Initiative
TIP	Transportation Improvement Program

TMP	Transportation Management Plan
TPH	Total Petroleum Hydrocarbons
TRPH	Total Recoverable Petroleum Hydrocarbons
TSCA	Toxic Substance Control Act
TSM	Transportation Systems Management
ug/m^3	Micrograms per Cubic Meter
ug/L	Micrograms per Liter
USC	United States Code
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound
WWTP	Wastewater Treatment Plant
YBI	Yerba Buena Island

APPENDIX E
CONSULTATION AND COORDINATION

APPENDIX E
CONSULTATION AND COORDINATION

This environmental document was prepared in consultation and coordination with various federal, state, and local agencies, organizations, and individuals of Bay Area communities. Agency consultation and public participation have been accomplished through a variety of formal and informal methods, including scoping meetings, a series of informal community open houses, responses to website letters requesting information, responses to e-mails, meetings with individual public agencies and interest groups, planned public hearings, and a series of informational newsletters. This section summarizes these activities.

PROJECT ORGANIZATION AND COMMITTEES

The Federal Highway Administration (FHWA) and the California Department of Transportation (Caltrans) are serving as joint lead agencies to prepare this Environmental Impact Statement/Statutory Exemption. The U.S. Coast Guard is a Cooperating Agency.

Project Development Team

A Project Development Team (PDT) was assembled by Caltrans to serve as a technical advisory committee to Caltrans decision-makers. The PDT consists of representatives from affected agencies and meets periodically to address project issues requiring technical direction or resolution.

The following agencies and organizations are part of the PDT:

Alameda-Contra Costa Transit District	Bay Area Council	Bay Area Rapid Transit District	Bay Bridge Coalition
California Highway Patrol	U.S. Coast Guard	Contra Costa Congestion Management Agency	U.S. Department of Defense
East Bay Municipal Utility District	Federal Highway Administration	Office of the Honorable George Miller, U. S. House of Representatives	Metropolitan Transportation Commission
U.S Navy	City of Oakland - Office of the Mayor	City of Oakland - Office of Community & Economic Development	Oakland Landmarks Preservation Advisory Board
City of Oakland Planning Department	City of Oakland Public Works Department	Oakland Base Reuse Authority	Port of Oakland
RIDES for Bay Area Commuters	City of San Francisco - Office of the Mayor	City of San Francisco - Mayor's Office, Treasure Island Project Office	City of San Francisco - Environmental Office
City of San Francisco - Department of Parking and Traffic	City of San Francisco - Planning Department	City of San Francisco - Department of Public Works	San Francisco Bay Conservation and Development Commission
San Francisco Bay Trail Project	San Francisco Transportation Authority		

Metropolitan Transportation Commission (MTC) Bay Bridge Design Task Force

Following the January 1997 recommendation from the Business, Transportation and Housing Agency to Governor Pete Wilson that consideration be given to replacement of the East Span, Bay Area legislators recommended that MTC coordinate local deliberations for the location, design, and potential funding strategies for a replacement structure. In February 1997, MTC formed the Bay Bridge Design Task Force to assist MTC in developing recommendations for bridge design options and amenities. The Task Force is comprised of seven MTC Commissioners.

The Task Force conducted a series of public meetings in April and May 1997 at which recommendations related to replacement alternatives were presented. The Task Force, with advice from its Engineering and Design Advisory Panel (see description following) and citizen and agency input, has adopted recommendations for the design and alignment of a replacement alternative. Seventeen EDAP recommendations were adopted by the Task Force on July 23, 1997. These recommendations are:

1. The Commission should support a two-year extension of tolls and establish a priority for use of the estimated $230 million as follows: first, for the additional costs for a cable-supported structure; second, for a portion of the cost of the Transbay Transit Terminal; and third, a bicycle and pedestrian facility on the East Span of the bridge should continue to be evaluated through the 30% design stage.
2. Caltrans should select two design teams to develop the two cable-supported alternatives to approximately 30% design stage, so that reliable information as to seismic performance, cost, visual design, and other issues can be obtained before a final recommendation is made.
3. The EDAP and the Bay Bridge Design Task Force should remain in place through the 30% design stage of the project to make final recommendation on bridge design type and thereafter to provide continuous review of final design and engineering details.
4. The existing eastern span of the Bay Bridge should not be retrofitted, but replaced with a new structure.
5. The new eastern span and existing western span retrofit should be designed to provide post-earthquake "lifeline" service.
6. The new eastern span should have ten traffic lanes, five in each direction, with two standard 10' shoulders in each direction as part of its base cost.
7. The new eastern span does not require a dedicated bus/carpool lane. Caltrans' design should minimize weaving conflicts between high occupancy and other vehicles at the transition from the dedicated HOV approach lanes to the bridge itself.
8. The new eastern span should be designed in accordance with Caltrans' proposed design loading which will accommodate the possibility of future rail service.
9. The Yerba Buena Island ramps are an inherent part of the bridge, and Caltrans has the responsibility to replace the ramps in order to assure safe traffic flow on the bridge.
10. The new eastern span should be built in the northern adjacent alignment.

11. The new eastern span should have a cable-supported main span with a single vertical tower with single or multiple legs in the transverse direction and single or multiple places of supporting cables.
12. The new eastern span should not be double-decked. It should have two parallel separated decks on the causeway section and either parallel separated decks or a single deck on the cable-supported span.
13. The structural elements of the new eastern span should be visually consistent throughout.
14. The causeway section should have long, equal span lengths, although closer span lengths might be necessary just adjacent to the Oakland shore.
15. For the causeway section, particular attention should be paid to the design of the supporting pier as it enters the water, including the possibility of submerging the pile cap below water.
16. The cable or suspension tower on the eastern span should be no taller than the suspension towers on the existing western span.
17. The "diamond" shape for the tower base should not be employed in any cable or suspension tower on the eastern span.

On June 22, 1998, the MTC Task Force adopted four additional recommendations that either were new or replaced some of the original recommendations. These recommendations were needed to account for engineering feasibility information that had become available after the original recommendations were adopted in June 1997.

18. For the causeway section, the pile cap should be above the water.
19. The cable-supported portion of the new east spans of the Bay Bridge should be a single-tower self-anchored suspension span.
20. A constant-depth steel and variable-depth concrete skyway with at least 160-meter (525-foot) spans should be carried to bid.
21. One 4.7-meter (15.5-foot) pedestrian/bicycle path on the south side of the new bridge should be constructed as part of this project.

Caltrans has provided technical support to the MTC Task Force and its EDAP. MTC Bay Bridge Task Force recommendations have been considered in the development of alternatives for the East Span Seismic Safety Project. Replacement Alternative N-6 Self-Anchored Suspension Design Option with a pedestrian/bicycle path reflects the Task Force's recommendation.

MTC Bay Bridge Design Task Force Engineering and Design Advisory Panel (EDAP)

The MTC Bay Bridge Design Task Force assembled 36 technical experts in structural and civil engineering and architecture to form the EDAP. Panel members include academic and consulting industry professionals. Organizations represented on the EDAP include:

- American Institute of Architects
- American Society of Civil Engineers
- Bay Conservation and Development Commission Design Review Board

- Bay Conservation and Development Commission Engineering Criteria Review Board
- Caltrans Peer Review Panel
- Caltrans San Francisco-Oakland Bay Bridge Review Panel
- Caltrans Seismic Advisory Board
- Structural Engineers Association of Northern California

The role of the EDAP is to provide expert technical analysis to the Task Force. In fulfilling this mandate, the EDAP has conducted a series of public meetings at which bridge design concepts were reviewed. The Task Force recommendations (see previous section) were developed through EDAP deliberations.

Bicycle/Pedestrian Advisory Committee and the Elderly/Disabled Advisory Committee

Shortly after the intent of Caltrans to retrofit or replace the East Span became public, bicycle enthusiasts became active in the East Span Seismic Safety Project advocating installation of a pedestrian/bicycle lane or path in replacement alternatives. Over the ensuing months, several more established and ad-hoc bicycle, alternative transit, and public access groups began to advocate non-vehicular access on the East Span. Caltrans initially met with several of the approximately 40 participating groups. Through internal organization of the groups, a few key point persons were selected to make up a Bicycle/Pedestrian Advisory Committee (BPAC) that would represent the interest of the numerous groups. During the course of this project, five meetings have been held with the BPAC.

The Elderly/Disabled Advisory Committee provides guidance to MTC and the bridge designers regarding accessibility and safety of a pedestrian and bicycle path for elderly and disabled path users. This group participates in the BPAC meetings and decision-making.

Oakland Gateway Joint Planning Group

The Oakland Gateway Joint Planning Group is an ad-hoc entity established among participating agencies to coordinate actions in the Oakland Touchdown area. The group was formed following a request from the East Bay Regional Park District (EBRPD) to the San Francisco Bay Conservation and Development Commission (BCDC) that efforts to establish a shoreline park in the Oakland Touchdown area be coordinated with East Span Seismic Safety Project alternatives. The overall goal of the Joint Planning Group is to have a masterplan agreement that includes funding and which agency is to be ultimately responsible for the proposed park.

Caltrans, as host of a series of joint planning meetings, has invited the participation of representatives of BCDC, EBRPD, Port of Oakland, City of Oakland, Oakland Landmarks Preservation Advisory Board, Oakland Army Base Reuse Authority, National Park Service and the Association of Bay Area Governments/Bay Trail.

As part of the joint planning efforts, East Span Project alternatives development has included investigation of gateway concepts at the Oakland Touchdown area to create a visually memorable East Bay arrival point when exiting the East Span. Gateway design concepts developed as part of the East Span Project have evolved in response to recommendations from joint planning group members to expand the gateway concept to include land design concepts at the touchdown currently owned by the Caltrans, Port of Oakland, and Oakland Army Base.

AGENCIES CONTACTED

Agencies formally or informally consulted during the preparation of this environmental document include the following:

Federal Transit Administration
U.S. Army
U.S. Army Corps of Engineers
U.S. Coast Guard
U.S. Environmental Protection Agency.
U.S. Fish and Wildlife Service
U.S. Department of the Interior
U.S. Navy
National Marine Fisheries Service
National Park Service
California Department of Fish and Game
State Historic Preservation Office
State Lands Commission
Dredged Materials Management Office
Association of Bay Area Governments
City of Oakland
City of San Francisco
East Bay Municipal Utility District
Metropolitan Transportation Commission
Native American Heritage Commission
Port of Oakland
Port of San Francisco
Regional Water Quality Control Board - San Francisco Region
San Francisco Bay Conservation and Development Commission

An extensive list of federal, state, and local agencies, organizations, and others received the Notice of Intent to prepare an EIS and the DEIS for review.

KEY AGENCY MEETINGS

NEPA/404 Integration Memorandum of Understanding (MOU) Process

Caltrans and the Federal Highway Administration (FHWA) began consultation with federal agencies participating in the NEPA/404 MOU process in August 1997 (see Appendix F for explanation of the NEPA/404 MOU process). 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) are asked to concur on the project purpose and need statement, criteria for alternative selection and range of alternatives to be considered, selected alternative, and final designs and right-of-way. In addition, concurrence on the jurisdictional delineation of wetlands and with Section 404(b)(1) is obtained.

Three meetings have been conducted to date under the MOU process. At those meetings, participants considered the seismic safety-based project purpose and need statement and the range of alternatives proposed for evaluation. Following the meetings, written concurrence was received from each agency. (See Appendix F.)

Federal, state, and regional agencies with regulatory and permitting obligations for the East Span Seismic Safety Project were invited to participate in the NEPA/404 MOU meetings. Participants in addition to the Agency MOU signatories included:

- U.S. Coast Guard
- San Francisco Regional Water Quality Control Board
- San Francisco Bay Conservation and Development Commission
- California Department of Fish and Game
- Metropolitan Transportation Commission

Consultation Pursuant to Section 106 of the National Historic Preservation Act

In April 1997, several organizations were invited to submit comments on the East Span Project with respect to historic properties. These organizations included:

- American Society of Civil Engineers, History & Heritage Committee
- Berkeley Architectural Heritage Association
- California Preservation Foundation
- Foundation for San Francisco's Architectural Heritage
- National Trust for Historic Preservation, Western Regional Office
- Oakland Heritage Alliance
- Oakland Landmarks Preservation Advisory Board
- San Francisco Landmarks Preservation Advisory Board

In July 1997, Caltrans gave a brief presentation on the East Span Project to representatives of the Oakland Landmarks Preservation Advisory Board, Oakland Heritage Alliance, California Preservation Foundation, and San Francisco Landmarks Preservation Advisory Board. The Oakland Landmarks Preservation Advisory Board responded by letter on January 14, 1998, advocating that consideration be given to retrofit of the existing bridge rather than replacement, and suggesting several mitigation measures if a demolition alternative is selected.

Municipal Outreach Meetings with the City of Oakland and City and County of San Francisco

Frequent meetings have been held with agency directors, planning officials and others with the City of Oakland and the City and County of San Francisco to discuss potential benefits and impacts of the project to each of the municipalities.

City of Oakland. Three formal meetings have been held to date with the Mayor's office and staff from Planning, Economic Development, Landmarks Preservation Advisory Board and Public Works divisions. City representatives have made presentations and comments at other public meetings, such as the MTC Bay Bridge Design Task Force EDAP. The City's key concerns are the aesthetic design of the East Span and the Oakland Touchdown area, mitigation for impacts to the historic qualities of the existing East Span and the potential for community involvement and employment during the construction phase.

City and County San Francisco. Numerous meetings have been held to date with various staff members, including the Mayor's Office, Planning, Traffic and Parking, and Public Works departments staff. The key concerns are alignment alternatives, land use, and access impacts at Yerba Buena Island and Treasure Island, and detours and ramps on Yerba Buena Island.

PUBLIC INVOLVEMENT

In addition to the scoping process and the public open houses, a variety of public participation activities have been conducted over the course of the engineering and environmental studies. The public has been encouraged to participate in the process by asking questions and making comments. Meetings were held with the general public and special interest groups. Public involvement activities are listed below followed by a brief description.

Scoping Meetings

Scoping meetings were hosted by the MTC Bay Bridge Design Task Force early in the NEPA process to solicit input on alternatives and issues to be evaluated in the DEIS. Meetings were held in Alameda, Contra Costa, San Francisco, and Solano counties in Spring and Summer 1997.

Environmental Organizations Meeting

Caltrans held a meeting with environmental interest groups and other members of the public in collaboration with the BCDC and the MTC. At the meeting, those present reviewed the project purpose and need, alternatives, and the environmental process and construction schedules. In addition, information was mailed out to several of the groups that did not attend.

Open Houses

A series of four public information open houses was provided to enable interested Bay Area residents and commuters to view the preliminary design concepts and obtain more information about the project. The open houses were held in Alameda, Contra Costa, San Francisco, and Solano counties with an attendance of approximately 300 people.

Presentations

In addition to the meetings formally presented in this Appendix, presentations have been made to various organized groups. These groups include:

Alameda County Congestion Management Agency
Alameda-Contra Costa Transit District
American Institute of Architects
American Public Works Association
American Society of Civil Engineers
Association of Environmental Professionals
Association of General Contractors
Bank of America
Bay Area Municipal Forum
Bike the Bridge Coalition
Building Futures Council
California League of Conservative Voters
California Preservation Foundation
California Transportation Commission
Californians for Better Transportation
Consulting Engineers and Land Surveyors of California
Contra Costa County Council
Design Alameda 2

Diablo Valley Lions Club
Emeryville City Council
Golden Gate Breakfast Club
Hercules Rotary Club
Institute of Electrical and Electronics Engineers
Institute of Transportation Engineers
International Right-of-Way Association
Joint Congestion Management Agency
Kiwanis Club
League of California Cities
Masonic Club
Oakland Chamber of Commerce
Oakland City Council
Oakland Landmarks Preservation Advisory Board
Oakland Rotary Club
Napa Engineers
North Bay Engineers Club
Peninsula Association of Contractors
Perry Street Residents
Piedmont City Council
Portland Concrete Cement Association
Retired Teachers Association
Rossmoor Engineers Club
San Francisco Chamber of Commerce
San Pablo Rotary Club
San Francisco Planning and Urban Research
Society of Professional Engineers
Sons in Retirement
South Bay Engineers
St. Paul's Towers
Structural Mechanics Association
West County Business and Professional Association
Western Council of Construction Consumers
Vacaville Rotary Club

Mailing List

A mailing list of interested parties has been compiled. The current mailing list contains approximately 3,500 names and addresses, including federal, state, and local agencies; elected and appointed officials; city and county staff persons; special interest groups; and the general public.

Newsletters

Two newsletters have been produced and distributed to the entire mailing list. These have described the study alternatives, process and schedule, announced the community workshop series, and provided information about study progress and activities. Newsletters will continue to be produced and distributed quarterly.

CHRONOLOGY OF CONSULTATION AND COORDINATION

Following is a chronology of key consultation and coordination events over the course of the studies leading to this document.

March 27, 1997, First MTC Bay Bridge Design Task Force meeting.

April 16, 1997, Opportunity for Scoping provided for interested agency staff and the general public at the MTC Bay Bridge Design Task Force meeting in Contra Costa County.

April 21,1997, A Notice of Intent was published in the Federal Register to announce the intent to prepare an EIS and provide a description of the alternatives being considered.

April 22, 1997, Opportunity for Scoping provided for interested agency staff and the general public at the MTC Bay Bridge Design Task Force meeting in Alameda County.

April 23, 1997, Opportunity for Scoping provided for interested agency staff and the general public at the MTC Bay Bridge Design Task Force meeting in Solano County.

May 8, 1997, Opportunity for Scoping provided for interested agency staff and the general public at the MTC Bay Bridge Design Task Force meeting in San Francisco County.

June 24, 1997, Second MTC Bay Bridge Design Task Force Meeting.

July 16, 1997, Third MTC Bay Bridge Design Task Force Meeting.

July 23, 1997, MTC Fourth Bay Bridge Design Task Force Meeting.

August 18, 1997, Formal letter request for listing of rare or endangered species to U.S. Fish and Wildlife Service; response dated on August 29, 1997.

September 9, 1997, First NEPA/404 Integration MOU meeting to discuss project purpose and need.

October 3, 1997, Environmental Organizations meeting.

October 7, 1997, Tour of Oakland Army Base property with the East Bay Regional Park District and Oakland Gateway Joint Planning Group.

October 8, 1997, Fifth MTC Bay Bridge Design Task Force meeting.

October 23, 1997, Second NEPA/404 Integration Meeting to discuss project purpose and need.

October 24, 1997, First coordination meeting with the City of Oakland.

October 28, 1997, First coordination meeting with the City and County of San Francisco to discuss the Treasure Island Redevelopment Plan.

October 28, 1997, First meeting with the Bicycle/Pedestrian Advisory Committee.

October 30, 1997, Second Meeting with the Oakland Gateway Joint Planning Group.

November 4, 1997, First Project Development Team meeting.

November 12, 1997, Sixth MTC Bay Bridge Design Task Force meeting.

November 13, 1997, Third NEPA/404 Integration MOU meeting to discuss alternatives.

November 18, 1997, Third meeting with the Oakland Gateway Joint Planning Group.

November 20, 1997, Second coordination meeting with the City and County of San Francisco.

December 8, 1997, Open House in Alameda County (Lake Merritt Sailboat House, Oakland).

December 9, 1997, Open House in Contra Costa County (JFK University Law School Auditorium, Walnut Creek).

December 11, 1997, Open House in San Francisco County (One Market Plaza, San Francisco).

December 16, 1997, Second meeting with the Bicycle/Pedestrian Advisory Committee.

January 14, 1998, Seventh MTC Bay Bridge Design Task Force meeting.

January 22, 1998, Third meeting with the Bicycle/Pedestrian Advisory Committee.

February 11, 1998, Eighth MTC Bay Bridge Design Task Force meeting.

February 17, 1998, Fourth meeting with the Bicycle/Pedestrian Advisory Committee.

February 18, 1998, Fourth meeting with the Oakland Gateway Joint Planning Group.

February 18, 1998, Second coordination meeting with the City of Oakland.

March 4, 1998, Fifth meeting with the Bicycle/Pedestrian Advisory Committee.

March 25, 1998, Open House in Solano County (Solano Mall, Fairfield).

March 30, 1998, Third coordination meeting with City and County of San Francisco.

April 7, 1998, Second Project Development Team meeting.

April 8, 1998, Ninth MTC Bay Bridge Design Task Force meeting.

April 17, 1998, Coordination meeting with the U.S. Navy.

April 27, 1998, Fourth meeting with the City and County of San Francisco.

May 7, 1998, Third coordination meeting with the City of Oakland.

May 13, 1998, Tenth MTC Bay Bridge Design Task Force meeting.

May 20, 1998, Fifth meeting with the Oakland Gateway Joint Planning Group.

June 10, 1998, Twelfth MTC Bay Bridge Design Task Force meeting. Public hearing to review design alternatives and EDAP recommendations.

June 18, 1998, San Francisco Bay Conservation and Development Commission hearing and vote on policy issues of concern related to the Bay Bridge Project.

June 22, 1998, Thirteenth MTC Bay Bridge Design Task Force meeting.

June 24, 1998, MTC meeting to adopt recommendations on bridge design and amenities and act on toll surcharge extension.

PERMITS AND APPROVALS

The following permits and/or approvals are required from the respective agencies:

Agency	Approval or Permit
U.S. Army Corps of Engineers	• Grant a Section 404 of the Clean Water Act Permit. • Grant approval for dredging in SF Bay. • Participate in the NEPA/404 Integration Process and provide agreement at various milestones.
U.S. Coast Guard	• Approve the location and placement of bridges under Section 9 of the 1899 Rivers and Harbors Act, as amended. • Convey easements on Yerba Buena Island.
U.S. Environmental Protection Agency	• Participate in the NEPA/404 Integration Process and provide agreement at various milestones. • Participate in the dredging permit process. • Review and comment on BCDC and Corps permits. • Review and comment on the EIS and technical studies.
U.S. Fish and Wildlife Service	• Engage in consultation regarding potential impacts to sensitive species in accordance with Section 7 of the federal Endangered Species Act. • Review and comment on BCDC and Corps permits. • Participate in the NEPA/404 Integration Process and provide agreement at various milestones.
U.S. Navy	• Signatory to a Memorandum of Understanding pursuant to Section 106 of the National Historic Preservation Act. • May convey easements and acquisitions on Yerba Buena Island.
National Marine Fisheries Service	• Engage in consultation regarding potential impacts to sensitive species in accordance with Section 7 of the federal Endangered Species Act. • Review and comment on BCDC and Corps permits. • Participate in the NEPA/404 Integration Process and provide agreement at various milestones.
Advisory Council on Historic Preservation	• Signatory to a Memorandum of Understanding pursuant to Section 106 of the National Historic Preservation Act.
Bay Conservation and Development Commission	• Approve a permit to place fill, extract materials or change the use of any land, water, or structure within its jurisdiction pursuant to the McAteer-Petris Act. • Participate in the dredging permit process. • Review and comment on BCDC and Corps permits. • Provide a federal Coastal Zone Management Act consistency determination.
California Department of Fish and Game	• Engage in consultation regarding sensitive species in accordance with the California Endangered Species Act. • Review and comment on BCDC and Corps permits. • Approve a permit for the use of explosives, if explosives will be used as part of the project.
Port of Oakland and Port of San Francisco	• May convey easements for temporary detours. • Grant drilling permits
Regional Water Quality Control Board	• Grant or waive a Section 401 of the Clean Water Act Water Quality Certificate. • Verify that the Stormwater Pollution Prevention Plan demonstrates compliance with the existing National Pollutant Discharge Elimination System Permit. • Participate in the dredging permit process. • Review and comment on BCDC and Corps permits.
State Historic Preservation Officer	• Signatory to a Memorandum of Understanding pursuant to Section 106 of the National Historic Preservation Act.
Dredged Material Management Office (DMMO) (consisting of the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the San Francisco Bay Conservation and Development Commission, and the Regional Water Quality Board.)	• Determine the eligibility of in-bay disposal for dredged materials.

APPENDIX F

NEPA/404 INTEGRATION PROCESS

APPENDIX F
NEPA/404 INTEGRATION PROCESS

In May 1992, the U.S. Department of Transportation, the U.S. Department of Army-Civil Works, and the U.S. Environmental Protection Agency (EPA) adopted an agency policy to improve interagency coordination and to integrate National Environmental Policy Act (NEPA) and Clean Water Act Section 404 procedures. A Memorandum of Understanding (MOU) was developed for Arizona, California, and Nevada that specifies how these states will implement the agency policy. The Western States MOU applies to all projects needing both Federal Highway Administration (FHWA)/Federal Transit Administration (FTA) action under NEPA and a U.S. Army Corps of Engineers individual permit under Section 404 of the Clean Water Act.

Under the MOU process, the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), U. S. Army Corps of Engineers (ACOE), and U.S. Environmental Protection Agency (EPA) are asked to concur on the project purpose and need statement, criteria for alternative selection, and range of alternatives to be considered, selected alternative, mitigation plans, and final designs and right-of-way. The ACOE will also verify the jurisdictional delineation of wetlands. In addition, the process will include obtaining concurrence with Section 404(b)(1) requirements.

The goal of the MOU is to have regulatory agencies participate in the project early on in the planning and to have decisions made once for each stage of the process in order to expedite matters. Regulatory agencies are to provide comments in a timely manner and are to provide written concurrence that information to date is adequate for a particular stage and that the project may proceed to the next stage. Agencies agree not to revisit previous concurrences unless there is significant new information or significant changes to the project, the environment, or laws and regulations. Agencies agree to attempt to resolve issues causing nonconcurrence and to try to do so informally before entering formal dispute resolution.

Consultation was initiated for the East Span Project with the ACOE, EPA, FTA, USFWS, and NMFS in accordance with the Western States MOU. A project overview and a preliminary project Purpose and Need Statement were presented to the federal agencies at the September 9, 1997 NEPA/404 Kick-off Meeting. A second Integration meeting was held on October 23, 1997. At this meeting, Purpose and Need Statement discussions continued, and an overview of the conceptual range of alternatives and design variations was presented. A third meeting was conducted on November 13, 1997, to continue the NEPA/404 Integration MOU process.

Comments on the Purpose and Need Statement were received, and the statement was revised accordingly. Additional meetings with the ACOE and the EPA were held to gain a greater understanding of the agencies' comments. After the revisions were made, letters of concurrence were received from the federal agencies. The agencies also provided written concurrence (letters follow) with the criteria for alternative selection and the range of alternatives being included in the Environmental Impact Statement for the East Span Project. Other federal, state, and regional agencies with

regulatory and permitting obligations for the East Span Seismic Safety Project were also invited to participate in the NEPA/404 MOU meetings. Participants included:

- U.S. Coast Guard
- San Francisco Regional Water Quality Control Board
- San Francisco Bay Conservation and Development Commission
- U.S. Navy
- California Department of Fish and Game
- Metropolitan Transportation Commission

The next step in the process is to have preliminary agreement from the agencies prior to approval of the final Environmental Impact Statement on the preferred alternative and the conceptual project mitigation for natural resources.

List of Letters

From	To	Date
San Francisco Bay Conservation and Development Commissions	Caltrans	9/12/1997
Caltrans	San Francisco Bay Conservation and Development Commission	9/18/1997
Caltrans	NEPA/404 Participants	9/26/1997
San Francisco Bay Conservation and Development Commission	Caltrans	10/9/1997
U.S. Coast Guard	Caltrans	10/23/1997
U.S. EPA	Caltrans	11/26/1997
U.S. Fish and Wildlife Service	Caltrans	12/17/1997
Caltrans	U.S. EPA	12/23/1997
Federal Transit Administration	Caltrans	1/21/1998
Caltrans	U.S. Army Corps of Engineers	1/26/1998
National Marine Fisheries Service	Caltrans	1/26/1998
U.S. Environmental Protection Agency	Caltrans	1/29/1998
Caltrans	National Marine Fisheries Service	2/4/1998
U.S. Army Corps of Engineers	Caltrans	2/13/1998
Caltrans	NEPA/404 Participant	2/17/1998
U.S. Fish and Wildlife Service	Caltrans	3/17/1998
National Marine Fisheries Service	Caltrans	4/2/1998
U.S. Environmental Protection Agency	Caltrans	4/6/1998
Federal Transit Administration	Caltrans	5/15/1998
Caltrans	U.S. Army Corps of Engineers	5/22/1998
U.S. Army Corps of Engineers	Caltrans	6/4/1998
U.S. Coast Guard	Caltrans	6/15/1998
U.S. Coast Guard	Caltrans	7/8/1998
Caltrans	U.S. Coast Guard	8/7/1998
Caltrans	U.S. Fish and Wildlife Service	8/7/1998
U.S. Army Corps of Engineers	Caltrans	8/20/1998
Caltrans	U.S. Army Corps of Engineers	8/27/1998
U.S. Fish and Wildlife Service	Caltrans	9/1/1998
U.S. Army Corps of Engineers	Caltrans	9/3/1998
U.S. Army Corps of Engineers	Caltrans	9/1998

STATE OF CALIFORNIA PETE WILSON, *Governor*

SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION
THIRTY VAN NESS AVENUE, SUITE 2011
SAN FRANCISCO, CALIFORNIA 94102-6080
PHONE: (415) 557-3686

Post-it™ brand fax transmittal memo 7671	# of pages ▸ 1
To Mike Davis	From Mara Melandry
Co. P.B.Q + D, Inc	Co. Caltrans D4
Dept.	Phone # 510-286-5582
Fax # 415-243-9501	Fax # 510-286-6374

September 12, 1997

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

ATTENTION: Ms. Mara Melandry, Environmental Manager

SUBJECT: **Review of the NEPA/404 Need and Purpose Statements for the San Francisco-Oakland Bay Bridge Replacement Project**

Ladies and Gentlemen:

I was unable to attend the NEPA/404 kick-off meeting, but would like to comment on the *Proposed Need and Purpose Statements* you submitted for our review. We concur with the Proposed Need Statement, but would like to recommend that the Proposed Purpose Statement be revised to remove the word "vehicular" from the first sentence of the statement.

It is our understanding that an alternative which includes the construction of a bicycle/pedestrian lane across the west crossing of the Bay Bridge will be evaluated in detail in the Environmental Impact Statement. We are concerned that this alternative may not be given full consideration simply because it would not meet your proposed purpose statement.

If you have any questions or would like to discuss this issue, please call me at (415) 557-8767.

Sincerely,

STEVEN A. McADAM
Deputy Director

SAM/CF/ra

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY PETE WILSON, *Governor*

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

September 18, 1997

Steve McAdam, Deputy Director
San Francisco Bay Conservation & Development Commission
30 Van Ness, Suite 2011
San Francisco, CA 94102-6080

Dear Mr. McAdam:

Thank you for your letter of September 12, 1997 regarding the purpose and need statement for the East Span Seismic Safety Project on the SFOBB. We will consider them in completing the purpose and need statement. Please note that the inclusion of the word vehicular in the statement does not preclude consideration of a bike/pedestrian lane across the bridge.

You also commented that you understood an alternative which includes a bike/pedestrian lane on the west span of the Bay Bridge will be evaluated in the EIS. We assume you meant the east span. A bike/pedestrian lane on the east span will not be evaluated as a separate alternative in the EIS for the East Span Seismic Safety Project. However, a bike/pedestrian lane on the east span will be discussed in the modal analysis portion of the EIS. A bike/pedestrian lane on the west span of the Bay Bridge could become a separate project in the future if there is legislative and public support for such an undertaking.

I hope this information clarifies the status of the bike/pedestrian lane.

If you have any questions, please call Mara Melandry, Environmental Manager for the Bay Bridge, at 510-286-5582.

Sincerely,

HARRY Y. YAHATA
District Director

By Denis Mulligan

DENIS J. MULLIGAN
District Division Chief
Toll Bridge Program

STATE OF CALIFORNIA—BUSINESS, TRANSPORTA. .N AND HOUSING AGENCY PETE WILSON, Governor

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

COPY

September 26, 1997

Ala/SF 80
01200K

Dear NEPA/404 Agency Participant:

Thank you for participating in the September 9, 1997 NEPA/404 MOU Integration meeting for the SFOBB East Span Seismic Safety Project. Your comments concerning the draft project Purpose and Need Statement are greatly appreciated. The draft chapter of the environmental impact statement (EIS) on Purpose and Need will be submitted to you in advance of document circulation for your review and comment.

The enclosed summary of the Purpose and Need Statement has been edited in response to comments received at the September 9, 1997 meeting. Each comment received has been carefully considered. Please note two issues which were raised that require further discussion by NEPA/404 MOU participants.

1. The Draft Purpose Statement includes a reference to a "vehicular" connection between Yerba Buena Island and the SFOBB Toll Plaza in Oakland. It was suggested that the term "vehicular" be eliminated. The intention of this revision was understood in the context of not limiting how the bridge would be used in the recovery period following a maximum credible earthquake (MCE). However, in the larger context of seismic safety during a MCE and emergency response following a major event, Caltrans recommends that the intention to replace a 10-lane vehicular structure with a like facility be clearly stated in the project purpose statement. Various planning agencies in the Bay Area have prepared emergency response scenarios and plans; all have indicated that the bridge would operate as a vehicular connection in the aftermath of a major seismic event. For this reason, Caltrans believes that "vehicular" needs to be retained in the statement.

The EIS will provide supporting discussion of the vehicular connection and will also address the feasibility and effectiveness of multi-modal usage of the bridge.

Therefore, we request your concurrence in retaining the use of the word "vehicular" in the statement. Additional clarification of how the project would be used in the recovery period following a MCE and identification of multi-modal opportunities created by retrofit or replacement of the existing East Span will be provided in the EIS Purpose and Need Chapter.

2. It was suggested that the discussion of FHWA requirements concerning current traffic operations and safety design standards for the bridge replacement alternatives was inferred and need not be included in the summary Purpose statement. As will become clear to

participants in our upcoming discussion of the range of alternatives under consideration for the project, attaining current design standards may influence alignment and project footprint. Additionally, operational and safety standards are an inherent part of purpose and need for any project involving new construction. The project Purpose Statement should clearly support the need to meet the current safety and operational standards, even at the cost of potential impacts that might be avoided by relaxing current standards.

Your concurrence is requested in retaining a reference to operational and safety standards in the Project purpose statement.

Additional recommendations discussed at the meeting are documented in the meeting minutes that will be distributed to you under separate cover.

The enclosed matrix is provided in response to a request at the September 9 meeting. The matrix summarizes regulatory and permitting requirements that apply to the SFOBB East Span Seismic Safety Project.

Thank you for your continuing, active participation in the East Span Seismic Safety Project NEPA/404 Integration MOU process. I will be contacting you to discuss the proposed revisions to the Purpose and Need Statement and discuss the schedule for obtaining your agency's written concurrence. If you have questions or need additional information, please contact Mara Melandry, Environmental Manager for the East Span Seismic Retrofit Project, at 510/286-5582.

Sincerely,

HARRY Y. YAHATA
District Director

by

DENIS J. MULLIGAN
District Division Chief
Toll Bridge Program

c: Congressman George Miller
c/o Kathy Hoffman

Enclosures

STATE OF CALIFORNIA PETE WILSON, *Governor*

SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION

THIRTY VAN NESS AVENUE, SUITE 2011
SAN FRANCISCO, CALIFORNIA 94102-6080
PHONE: (415) 557-3686

OCT 10 1997

97 OCT 10 AM 10:35 EXECUTIVE OFFICE

October 9, 1997

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

DJM

ATTENTION: Mr. Denis J. Mulligan, District Division Chief

SUBJECT: **Review of the NEPA/404 Need and Purpose Statements for the San Francisco-Oakland Bay Bridge Replacement Project**

Ladies and Gentlemen:

Thank you for your letter dated September 26, 1997 requesting our concurrence in retaining the use of the word "vehicular" and a reference to operational and safety standards in the Project Purpose Statement.

As previously stated in my letter dated September 12, 1997 addressed to Ms. Mara Melandry, we request that the proposed Purpose Statement be revised to remove the word "vehicular" from the first sentence of the statement. We have reviewed the Purpose and Need Statements for the Carquinez and the Benicia Martinez Bridges and neither statement includes the word "vehicular." We have also consulted a documented titled "Guidance Papers to facilitate the Implementation of the Memorandum of Understanding for the NEPA and Section 404 Integration Process", which states, in part, that the Purpose and Need Statement "...provides the basis for selecting reasonable and practicable alternatives for consideration; analyzing those alternatives in depth; and is an important factor in selecting the preferred alternative." Our concern is that the inclusion of the word "vehicular" could be construed as a predisposition to exclude or not adequately consider the potential for other transportation modes. In accordance with the Guidance Papers, we believe that the purpose of the project should be "broad enough to allow consideration of a full range of alternative ways to meet the defined need."

We do concur, however, in retaining the reference to the operational and safety standards in the Project Purpose Statement.

If you have any questions or would like to discuss this issue, please call me at (415) 557-8767.

Sincerely,

STEVEN A. McADAM
Deputy Director

SAM/CF/ra

RECEIVED
OCT 10 199-
B. QU

U.S. Department of Transportation
United States Coast Guard

Commander (Pow-2)
Eleventh Coast Guard District

Bldg. 50-6
Coast Guard Island
Alameda, CA 94501-5100
Phone: (510)437-3514
FAX: (510)437-5836

16591
Ser: Pow 543-97
San Francisco Bay (8.9)
October 23, 1997

Mr. Denis Mulligan
District Division Chief, Toll Bridge Program
California Department of Transportation, District 04
Box 23660
Oakland, CA 94623-0660

Dear Mr. Mulligan:

Thank you for your letter of September 26, 1997 requesting Coast Guard concurrence with the draft project Purpose and Need Statement. As cooperating agency with the Federal Highway Administration for the new East San Francisco-Oakland Bay Bridge, the Coast Guard concurs with your purpose and need statement, and with retention of the word "vehicular" therein. We also concur with retaining reference to operational and safety standards in the Project purpose statement. We caution, however, that if pier placement is influenced by alignment changes necessary to satisfy these operational and safety standards, the piers be aligned to "mirror" the existing east San Francisco Oakland Bay Bridge span piers. Our request that the new piers mirror the existing piers was stated at the September 9 NEPA/404 Kick-Off Meeting, and was referenced in the CalTrans' minutes to the meeting received in our office on October 14, 1997.

The minutes also confirmed that a Coast Guard Section 9 bridge permit under the 1899 Rivers and Harbors Act, as amended, would be required. CalTrans had indicated in the minutes that retrofitting these piers for alternative uses does not seem feasible; the Coast Guard bridge permit will accordingly require that they be removed to the mud line, or to a level requested by the U.S. Army Corps of Engineers. Despite the environmental and engineering challenges involved with their removal, the requested removal is also consistent with BCDC policies, and is a standard consideration in Coast Guard Section 9 bridge permits.

I endorse Mr. Jerry Olmes' suggestion at the kickoff meeting that, in consideration with the Section 9 permit, the Coast Guard would coordinate issuance of a joint Section 404 public notice with the U.S. Army Corps of Engineers. I also agree with his expectation that no marine operations study would be needed to address marine impacts during construction of the new bridge, or removal of the existing bridge since most large commercial vessel traffic passes beneath the west Bay Bridge span. In addition, our Marine Safety Office San Francisco (MSO) would prepare a pre-construction checklist to address information the Coast Guard will need to advise marine interests of in our Local Notice to Mariners when the bridge is built. Our development of the checklist would not occur, however, until after the Section 9 permit is issued.

Our Coast Guard Vessel Traffic Service (VTS) has confirmed that the tower constructed as part of the new single-tower cable-stayed bridge or single-tower self-anchored suspension bridge will not adversely affect operation of their radar systems.

16591
October 23, 1997

Please do not hesitate to contact Jerry or me at (510) 437-3514 if we may offer any comments or answer any questions.

Sincerely,

W.R. TILL
Chief, Bridge Section
U.S. Coast Guard
By direction of the District Commander

Copy: FHWA
BCDC
U.S. Army Corps of Engineers
Coast Guard MSO San Francisco
Coast Guard VTS San Francisco

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

November 26, 1997

Denis J. Mulligan
District Division Chief
Toll Bridge Program
California Department of Transportation
P.O. Box 23660
Oakland, CA 94623-0660

Dear Mr. Mulligan:

We are writing this letter to request additional information necessary for EPA to concur on the Purpose and Need Statement for the San Francisco-Oakland Bay Bridge (SFOBB) Retrofit project. Pursuant to the NEPA/404 Memorandum of Understanding (MOU), FHWA sent us a letter requesting concurrence on the purpose and need statement (statement dated October 30, 1997). As you know, our staff has been regularly attending the NEPA-404 meetings discussing the SFOBB Retrofit project. We have requested this additional information from the Caltrans staff at the last two meetings (10/23/97 and 11/13/97) and have yet to receive a response to our requests. At this point, we still do not feel that EPA has sufficient information to make a determination about whether to concur on the proposed Purpose & Need statement. Below is a specific description of the information we will need to make a determination about Purpose & Need.

Our major concern with the proposed Purpose and Need statement is that the specific definition of, and objectives for, maintaining a "life line connection" is unclear. Is the intent of a lifeline connection to allow the SFOBB to operate at existing LOS after an earthquake until other necessary repairs to the infrastructure are completed, estimated at 6 months to five years, and how would FHWA accomplish this? The overall intent of the life line connection should, we believe, correspond to the regional needs expected after a major earthquake occurs. The expected time frame for the SFOBB to maintain a reasonable connection as a "life line connection" as well as the regional needs of the SFOBB after a major earthquake should be incorporated, and/or explained as part of the definition of this term.

We also requested information on whether the San Francisco/East Bay Ferry Service and/or the BART trains are can provide or are being retrofitted to provide a lifeline connection after a Maximum Credible Earthquake (MCE). While we realize that Caltrans and FHWA are not responsible for ensuring that those facilities can withstand an MCE, we are concerned that if those systems are not operational after a MCE then the SFOBB will become an even more essential component for allowing movement of people across the Bay. Therefore, if BART and the Ferry Services are NOT expected to be operational after a MCE, we would expect that the Bay Bridge would be seriously affected in its level of service and fail to serve as a functional transportation

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corridor, similarly as it was during the recent BART strike. If, on the other hand, one or both of those services are to be operational, we would anticipate a reduced and more manageable demand on the Bay Bridge. Therefore, information on these two key components of the regional transportation network is crucial to determining the definition of a "lifeline connection" and subsequent alternatives for meeting that standard.

Finally, as requested in earlier meetings, we will need to see a draft of the actual text for the Purpose and Need statement (with subsequent clarification of a "lifeline connection") before we can make a determination about the purpose and need statement. We feel that the overhead bullets provided and discussed at the interagency are useful in fostering discussion about the pertinent issues but are not sufficient for our needs as a concurring agency. We look forward to reviewing the full text of the proposed Purpose & Need statement.

Please refer to the October 23, 1997 meeting minutes for further clarification on the issues that we have raised. Also, since we have yet to receive this information that had been previously requested, we ask that Caltrans and FHWA allow us to provide our response and/or concurrence one month after receipt of the requested material. Should you have any questions about this issue you may contact me at (415) 744-1577.

Sincerely,

David J. Carlson
Life Scientist, Federal Activities Office

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office
3310 El Camino Avenue, Suite 130
Sacramento, California 95821-6340

DEC 31 1997
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DEC 31
B. GUAN

IN REPLY REFER TO:

PPN 2419

December 17, 1997

DJM

Denis J. Mulligan
District Division Chief
State of California Department of Transportation
Box 23660
Oakland, Ca 94623-0660

Subject: San Francisco-Oakland Bay Bridge East Span Seismic Safety Project, NEPA/404 Integration, San Francisco Bay, City of Oakland, San Francisco and Alameda Counties, California

Dear Mr. Mulligan:

This letter is in response to a October 30, 1997, California Department of Transportation (Caltrans) request for the U.S. Fish and Wildlife Service's (Service) concurrence with the Purpose and Need Statement of the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project. Our response is made pursuant to the 1994 Memorandum of Understanding on Integration of the National Environmental Policy Act and Clean Water Act Section 404 Procedures for Surface Transportation Projects and is not intended to take the place of any formal comments that may be required under the Fish and Wildlife Coordination Act or the Endangered Species Act of 1973 as amended.

The Service has reviewed information provided by Caltrans concerning this project and concurs with the Purpose and Need for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project.

If you have any questions concerning the Service's comments on this project, please contact Mark Littlefield (Wetlands Branch) at (916) 979-2113.

Sincerely,

Wayne S. White
Field Supervisor

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY PETE WILSON, Governor

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

December 23, 1997

File: 04-SF-80-7.6/8.9
04-Ala-80-0.00/1.3
SFOBB
East Span Seismic Safety Project

David Carlson
Federal Activities Office
United States Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, California 94105-3901

Dear Mr. Carlson:

As you requested in your letter of November 26, 1997, we are providing the draft purpose and need statement regarding the East Span Seismic Safety Project. As you further requested, Dan Harris and Bill Wong of FHWA have reviewed the draft statement; it reflects their comments.

The goal of providing the draft statement is to give you the background information in order for you to concur on purpose and need as set forth in the NEPA/404 MOU. The NEPA/404 MOU requires EPA to concur on purpose and need and does not require EPA to review and concur with the draft statement. The statement includes the definition and objectives of maintaining a lifeline vehicular connection and will answer your questions about this issue. As explained in the draft purpose and need statement, the bridge (after retrofitting to lifeline standards) will be immediately serviceable in the event of a maximum credible earthquake (MCE). We believe that the definition of lifeline is clear and needs no further discussion for your concurrence beyond what is provided by the draft purpose and need statement.

The information in the attachment addresses your request for information on BART and ferries after an MCE. Although BART and the ferries' emergency preparedness are a regional planning matter, outside the purview of both Caltrans and EPA, we trust the information will be useful to you in concurring with the purpose and need of the project. You will note that both these transportation modes are prepared to carry people to and from their jobs or other destinations following an MCE. There will be additional information in the environmental document about the Bay Area's overall response to an MCE and the responsibilities of the numerous public agencies that would be involved in responding to such an event.

In your letter you indicated EPA believed that the bridge was not functional during the recent BART strike because of increased demand, thus leading to your conclusion that it might not function if BART were inoperable after an MCE. It is Caltrans' estimation that the level of service (LOS) after an MCE would be low if BART and the ferries were not operating, which will not be the case; however, the bridge would indeed still allow movement of freight, goods and people across the Bay. In other words, it would still function.

We agree that you have 30 days to concur with the purpose and need of the project. We strongly believe that we have provided all the necessary information for EPA to do so within the 30-day time frame.

If you have any questions, please call Mara Melandry at (510) 286-5582.

Sincerely,

HARRY Y. YAHATA
District Director

by Denis Mulligan

DENIS J. MULLIGAN
District Division Chief
Toll Bridge Program

Enclosures

c: Vicki Alvarez (U. S. Army Corps of Engineers)
Becky Tuden (U. S. Environmental Protection Agency)
Donna Turci (Federal Transit Administration)
Mark Littlefield (U. S. Fish and Wildlife Service)
Jerry Olmes (U. S. Coast Guard)
Chris Mobley (National Marine Fisheries Service)
Becky Ota (California Department of Fish and Game)
Congressman George Miller

bc: JSchultz/BWong (FHWA – Calif. Division, Sacramento)
DHarris (FHWA – Region IX, San Francisco)
DMulligan
BMaroney
TAnziano (Caltrans Legal – SF)
SHulsebus/PChongchaikit
MMelandry/MMortenson
CAdams (HQ Envir. Division)
[redacted]
File

U.S. Department
of Transportation
Federal Transit
Administration

REGION IX
Arizona, California,
Hawaii, Nevada, Guam

201 Mission Street
Suite 2210
San Francisco, CA 94105
415-744-3133
415-744-2726 (fax)

JAN 21 1998

Mr. Dennis J. Mulligan
District Division Chief
Toll Bridge Program
California Department of Transportation
Box 23660
Oakland, CA 92623-0660

Re: Draft Purpose and Need Statement (CONCURRANCE)
East Span Seismic Safety Project

Dear Mr. Mulligan:

The Federal Transit Administration (FTA) has received your letter of December 23, 1997, transmitting the draft purpose and need statement for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project. FTA has reviewed it and concurs with the draft statement.

If you should have any questions, please call Mrs. Donna Turchie, Transportation Representative, at (415) 744-3115.

Sincerely,

Robert Hom, Director
Office of Planning & Program Development

cc: Mara Melandry
Environmental Planning-D4
California Department of Transportation
Box 23660
Oakland, CA 92623-0660

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY PETE WILSON, Governor

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

January 26, 1998

Ms. Victoria Alvarez
Caltrans Liaison
Regulatory Branch
United States Army Corps of Engineers
333 Market Street
San Francisco, California 94105-2197

File: 04-SF-80-7.6/8.9
04-ALA-80-0.00/1.3
04228-01200K
SFOBB
East Span Seismic Safety Project

Dear Ms. Alvarez:

Subject: SFOBB East Span Seismic Safety Project – NEPA/404 Concurrence

Enclosed is the draft purpose and need statement for the East Span Seismic Safety Project. It was previously sent to the Environmental Protection Agency on December 23, 1997, with copies sent to the Army Corps of Engineers and each of the other NEPA/404 MOU signatories.

Per your request, we are addressing this request directly to the Army Corps of Engineers to enable you to respond. Please review the enclosed materials as necessary and provide your final concurrence on purpose and need as set forth in the NEPA/404 MOU concurrence. In keeping with the decision of the NEPA/404 signatories in our meetings, we appreciate your willingness to concur on purpose and need before we request concurrence on alternatives and criteria for alternative selection. We appreciate your expeditious efforts in this matter.

If you have any questions. please call Mara Melandry at (510) 286-5582.

Sincerely,

HARRY Y. YAHATA
District Director

by

Mara Melandry

for DENIS J. MULLIGAN
District Division Chief
Toll Bridge Program

c: Becky Tuden (U. S. Environmental Protection Agency), Dave Carlson (U. S. Environmental Protection Agency), Donna Turci (Federal Transit Administration), Mark Littlefield (U. S. Fish and Wildlife Service), Chris Mobley (National Marine Fisheries Service), Jerry Olmes (U. S. Coast Guard), Becky Ota (California Department of Fish and Game), Congressman George Miller

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404-6528

January 26, 1998 F/SW022:CTM

Ms. Mara Melandry
Senior Environmental Planner
CalTrans District 4
111 Grand Avenue
P.O. Box 23660
Oakland, California 94623-0660

Dear Ms. Malandry:

Thank you for the opportunity to comment on the December 19, 1997, draft project purpose and need statements for the *San Francisco-Oakland Bay Bridge East Span Seismic Safety Project.* I do not have any objections to these purpose and need statements.

I look forward to reviewing future National Environmental Policy Act/ California Environmental Quality Act documents related to this project.

Sincerely,

James R. Bybee
Environmental Coordinator
Northern Area

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

DJM

January 29, 1998

RECEIVED
FEB 5 - 1998
B. QUAN

Denis J. Mulligan
District Division Chief
Toll Bridge Program
California Department of Transportation
P.O. Box 23660
Oakland, CA 94623-0660

Dear Mr. Mulligan:

The Environmental Protection Agency has reviewed the information provided in your letter of December 23, concerning the proposed Purpose and Need Statement for the San Francisco-Oakland Bay Bridge (SFOBB) Retrofit project, Alameda County. Pursuant to the NEPA/404 Memorandum of Understanding (MOU), FHWA sent us a letter requesting concurrence on the purpose and need statement (statement dated October 30, 1997). We have been attending NEPA-404 meetings discussing the SFOBB Retrofit project since then to discuss the issues related to Purpose and Need.

We appreciate the documentation answering our questions and concerns. The Purpose and Need is far more extensive and detailed than what we had previously been given. Therefore, we are pleased to offer our concurrence on the Purpose and Need statement as it is presented. We believe that the NEPA-404 MOU process has worked well in this case; the documentation has greatly improved, clearly defining the issues and laying out the scope of the project. The overall project should benefit from these clarifications.

However, we want to clarify a point made in your December 23, letter. You state that you believe that the NEPA-404 MOU only requires EPA to concur on Purpose and Need and not on the draft statement of Purpose and Need. We are unclear about the distinction you are trying to make. We assume that if we grant concurrence on a Purpose and Need statement, at the Draft Environmental Impact Statement (DEIS) development stage, that "text" would be the same statement provided in the DEIS. Please review the Guidance papers of the NEPA-404 MOU, which state that at the project development stage, the need for a project must be ***very specific***. Information gathered during the earlier transportation planning and project planning stages should ensure that the project need is well defined at the project development stage. The Guidance papers go further to declare: "It is critical that the process which identified and quantified this specific need be explained clearly and concisely within the NEPA environmental document." If, as in this case, we don't review or concur on any documentation prior to what is presented in the project development stage, we must assume that all previous project and planning issues will be brought forward in a well developed Purpose and Need statement, as outlined in the MOU.

The NEPA-404 MOU asks that FHWA and Caltrans provide as much information, as clearly as possible, to the resource agencies so that we may understand the foundations for proposing a project. This enables us to offer suggestions and, if needed, guidance on alternatives, which in turn should improve the project and environmental documentation, moving it forward expeditiously. Therefore, we disagree with your interpretation of what our concurrence responsibilities are. Instead we would say that EPA's concurrence, at this stage, is on the **NEPA** Purpose and Need statement/404 basic and overall project purpose, not an outline of a purpose and need for a project. The documentation previously offered was more appropriate for addressing issues at the pre-scoping stage. The documents you provided on December 23, contained the appropriate level of detail for our concurrence at the Draft EIS development stage.

Thank you again for providing the information. Should you have any questions, or would like to discuss these issues further, please contact me at (415) 744-1577.

Sincerely,

David J. Carlson
Life Scientist, Federal Activities Office

cc: M. Littlefield (U.S. F&WS)
V. Alvarez (U.S. ACE)
D. Turci (FTA)
D.Harris (FHWA)
B.Wong(FHWA)

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY PETE WILSON, Governor

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

February 4, 1998

Ala/SF 80
02100K

Mr. William T. Hogarth, Ph.D.
Acting Regional Administrator
National Marine Fisheries Services
Southwest Region
501 West Ocean Blvd., Suite 4200
Long Beach, CA 90802-4213

Dear Dr. Hogarth:

By this letter, we request concurrence that our proposed drilling work in San Francisco Bay will have no adverse effect to the endangered winter run Chinook salmon, the threatened west coast steelhead trout and the proposed threatened central valley steelhead trout. The drilling is necessary to assess bedrock and soil conditions for the East Span Seismic Safety Project. The drilling will consist of 12 borings in the Bay, and will be located north of the existing bridge. The drill equipment will be transported on two barges. The drill hole will be advanced inside a 24" diameter drill casing; the drill tools are inside the casing. All drilling fluids will be recirculated and collected on the barge. The drill fluids and cuttings will be tested and disposed of appropriately at designated disposal sites. No significant increase in turbidity due to barge drilling operations is anticipated.

This request is being made under the informal consultation provision of section 7 of the Endangered Species Act of 1973, as amended. The Federal Highway Administration has delegated Caltrans as their non-federal representative for section 7 consultations. We appreciate your assistance in this matter.

If you have any questions or need additional information, please call Sid Shadle, 510-286-6220.

Sincerely,

HARRY Y. YAHATA
District Director

By Marcia Melandry
for DENIS J. MULLIGAN
District Division Chief
Toll Bridge Program

cc: Chris Mobley (National Marine Fisheries
John Schultz (FHWA)

bc: MMelandry/MMortenson, SHulsebus/PC
Sid Shadle Mike Davis (Parsons)

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

FEB 1 ? 1998

REPLY TO
ATTENTION OF:

Regulatory Branch

RECEIVED
FEB 17 1998
B. QUAN

SUBJECT: File Number 23013S

Mr. Dennis Mulligan
California Department of Transportation
111 Grand Avenue
Oakland, California 94623--0660

Dear Mr. Mulligan:

Thank you for your letter dated January 26, 1998, requesting final concurrence on the purpose and need statement and supporting documentation for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project pursuant to the NEPA/404 Integration Process Memorandum of Understanding (MOU). The Corps issued preliminary concurrence on the draft purpose and need statement for this project on November 5, 1997, based on your draft submittal sent on October 30, 1997. The final documentation contained in your January 26, 1998 submittal includes sufficient documentation on the project purpose and need to satisfy this step in the NEPA/404 Integration Process.

This letter serves as the Corps' final concurrence with the purpose and need statement, as provided in your January 26, 1998, submittal (attached). We look forward to continuing the NEPA/404 Integration Process for this project. It is our understanding that our next discussion and concurrence point is the review of criteria for alternative selection and project alternatives to be evaluated in the draft Environmental Impact Statement.

If you have any questions, please contact Victoria Alvarez, of my staff at 415-977-8472. If you wish to write, please address all correspondence to the District Engineer, Attention: Regulatory Branch, and refer to the file number at the head of this letter.

Sincerely,

Calvin C. Fong
Chief, Regulatory Branch

Enclosure

STATE OF CALIFORNIA—BUSINESS, TRANSPORTA AND HOUSING AGENCY PETE WILSON, Governor

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

February 17, 1998

Dear NEPA/404 Participant:

Thank you for your continuing participation in the NEPA/404 Integration MOU process for the San Francisco-Oakland Bay Bridge (SFOBB) East Span Seismic Safety Project. Written concurrence in the project Purpose & Need has been received from all NEPA/404 Integration MOU participants and other participating agencies.

We now request your agency's written concurrence in 1) the criteria for alternatives selection and 2) the range of alternatives to be included in the SFOBB East Span Seismic Safety Project Draft Environmental Impact Statement. A general overview of the conceptual range of alternatives and design variations was presented at the October 23, 1997 NEPA/404 Integration meeting at Caltrans offices (see attached presentation materials). At the November 17, 1997 meeting, the selection criteria Caltrans and the FHWA propose to use to establish the range of alternatives were presented. The NEPA/404 participants made some excellent suggestions, which we have added.

The criteria and range of alternatives presented for your concurrence are summarized in the following paragraphs.

Selection Criteria for Range of Alternatives

- Meets Caltrans criteria for designation as a lifeline route
- Meets current standards for operations and safety to the greatest extent possible
- Maintains the existing number of traffic lanes during peak hours and after construction
- Does not preclude a pedestrian/bicycle path
- Does not preclude future improvements to Yerba Buena Island (YBI) access ramps
- Minimizes impacts to environmental resources
- Provides a high level of visual quality
- Is a cost effective solution

Conceptual Range of Alternatives

The attached "San Francisco-Oakland Bay Bridge East Span Seismic Safety Project Alternatives Description Matrix" provides a summary of the alternatives.

Alternatives:

- No-Build
- Retrofit Existing Bridge
- N-1 (northernmost replacement alignment)
- N-2 (replacement alignment nearest to the north of the existing SFOBB East Span)
- S-1 (replacement alignment nearest to the south of the existing SFOBB East Span)
- S-2 (southernmost replacement alignment)

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

Profile Variations:
- Level approach grade
- Constant grade
- Elevated grade

Pedestrian/Bicycle Path Variations:
- With
- Without

Alternatives Considered and Withdrawn from Further Consideration

Caltrans has conducted a preliminary screening of alternatives based on the proposed criteria for defining the range of alternatives. Results of this screening were presented to NEPA/404 Integration MOU participants at the October and November 1997 meetings. Alternatives recommended for withdrawal from consideration include:

- Double deck structure - inability to provide open views toward the East Bay to eastbound travelers and increased cost of structural supports (visual quality and cost effectiveness)
- Northern Extended Alignment - potential siting of bridge piers on unstable geologic foundations (cost effectiveness of complex piers and footings)
- Southern Alignments - southern alignments that would completely displace the East Bay Municipal Utility District sewer outfall or could not be built due to construction staging impacts adjacent to the YBI tunnel east portal (cost effectiveness and environmental effects of dredging for replacement outfall)
- Northern Alignment - providing a straight alignment westbound from the SFOBB Toll Plaza due to impacts to Radio Point Beach (potential environmental impacts)

Based on the information summarized here, meeting presentations and discussions and the minutes documenting the two meetings, we anticipate you will be able to provide your written concurrence in the criteria for defining alternatives and the range of alternatives to be considered. Your letter of concurrence is requested within 45 days or less from receipt of this letter. A signature block has been provided below should you wish to document your concurrence by signing and returning this letter to Mara Melandry, Environmental Manager for the SFOBB East Span Seismic Safety Project.

If you have questions or comments or need additional information to expedite written concurrence, please contact Mara Melandry at 510/286-5582.

Sincerely,

HARRY Y. YAHATA
District Director

by

for DENIS J. MULLIGAN
District Division Chief
Toll Bridge Program

I concur with the SFOBB East Span Seismic Safety Project alternatives selection criteria and range of alternatives proposed for study by Caltrans.

_____ _____

Signed Date

_____

Representing

Enclosure

Distribution list (NEPA/404 signatories)
Dave Carlson (USEPA)
Mark Littlefield (USFWS)
Calvin Fong/Victoria Alvarez (USACOE)
Robert Horn/Donna Turci (FTA)
Dan Harris (Region IX (FHWA)
John Schultz (Calif. Division, FHWA)
James R. Bybee/ Chris Mobley (NMFS)

c: Congressman George Miller
Becky Ota (CF&G)
Steve Heminger (MTC)
Greg Walker/Andrea Gaut (RWQCB)
Christine Ferraz (BCDC)
Jerry Olmes (USCG)

bc: TAnziano, SHulsebus, MMelandry/MMortenson, CAdams, MDavis (PB)

04-SF-80-7.6/8.9
04-ALA-80-0.0/1.3
01200K
East Span Seismic Safety Project

Post-it™ brand transmittal memo 7671 | # of pages ▸ 1

To [redacted]	From Marilee Martinson
Co. [redacted]	Co.
Dept.	Phone # 510-286-6212
Fax #	Fax #

United States Departm

FISH AND WILDLIF
Sacramento Fish and W
3310 El Camino Avenu
Sacramento, California 95821-6340

IN REPLY REFER TO:
PPN 2419

March 17, 1998

Denis J. Mulligan
District Division Chief
State of California Department of Transportation
Box 23660
Oakland, California 94623-0660

Subject: San Francisco-Oakland Bay Bridge East Span Seismic Safety Project, NEPA/404 Integration, San Francisco Bay, City of Oakland, San Francisco and Alameda Counties, California

Dear Mr. Mulligan:

This letter is in response to a February 17, 1998, California Department of Transportation (Caltrans) request for the U.S. Fish and Wildlife Service's (Service) concurrence with the criteria for alternative selection and the range of alternatives to be included in the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project (SFOBB). Our response is made pursuant to the 1994 Memorandum of Understanding on Integration of the National Environmental Policy Act and Clean Water Act Section 404 Procedures for Surface Transportation Projects and is not intended to take the place of any formal comments that may be required under the Fish and Wildlife Coordination Act or the Endangered Species Act of 1973, as amended.

The Service has reviewed the information provided by Caltrans concerning this project and concurs with the criteria for alternative selection and the range of alternatives to be included in the SFOBB Draft Environmental Impact Statement.

If you have any questions concerning the Service's comments on this project, please contact Mark Littlefield (Wetlands Branch) at (916) 979-2113.

Sincerely,

for Wayne S. White
Field Supervisor

cc: ARD-KCE, FWS, Portland, OR
EPA, San Francisco, CA (Attn: M. Monroe)
Corps of Engineers, San Francisco, CA
CDFG, Yountville, CA (Attn: F. Botti)

If you have questions or comments or need additional information to expedite written concurrence, please contact Mara Melandry at 510/286-5582.

Sincerely,

HARRY Y. YAHATA
District Director

by

Mara Melandry
for DENIS J. MULLIGAN
District Division Chief
Toll Bridge Program

I concur with the SFOBB East Span Seismic Safety Project alternatives selection criteria and range of alternatives proposed for study by Caltrans.

James Parfett
Signed

30 MARCH 1998
Date

Natl Marine Fisheries Serv.
Representing

Enclosure

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Habitat Conservation Division
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404

APR 0 3 1998

April 2, 1998 F/SWO:DWC

Mr. Harry Yahata
Cal Dept. Of Transportation
Box 23660
Oakland CA 94623-0660

EXECUTIVE OFFICE
98 APR -3 PM 2:44

Dear Mr. Yahata:

Enclosed is our agency's concurrence to the 1) criteria for alternatives selection and 2) range of alternatives to be included in the SFOBB East Span Seismic Safety Project Draft Environmental Impact Statement.

Sincerely,

Dan Cheng, LT, NOAA

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

April 6, 1998

Denis J. Mulligan
District Director
Caltrans District 4
P.O. Box 23660
Oakland, CA 94623-0660
Attn: Mara Melandry, Environmental Manager

Dear Mr. Mulligan:

The Environmental Protection Agency has reviewed the information provided in your letter dated February 17, concerning the proposed San Francisco-Oakland Bay Bridge (SFOBB) East Span Seismic Safety Project. In your letter you requested our concurrence on both the criteria for alternatives selection and the range of alternatives to be considered within the Draft Environmental Impact Statement/Report. Pursuant to the NEPA/404 Memorandum of Understanding (MOU), we are pleased to offer our initial concurrence on 1) the criteria for alternatives selection and 2) the range of alternatives to be included within the SFOBB East Span Seismic Safety Project Draft Environmental Impact Statement/Report.

We appreciate your efforts in providing information in keeping with the NEPA/404 MOU. I look forward to reviewing the Draft Environmental Impact Statement/Report. Should you have any questions, please contact me at (415) 744-1522. If you have any questions regarding Section 404 issues, you may contact Rebecca Tuden in our Clean Water Act Compliance Office at (415) 744-1987.

Sincerely,

Mark H. Bartholomew

Mark H. Bartholomew
Life Scientist

cc: FHWA (Dan Harris)

sfobbmou.ltr #003062

Printed on Recycled Paper

cc: Mara

If you have questions or comments or need additional information to expedite written concurrence, please contact Mara Melandry at 510/286-5582.

RECEIVED
MAY 18 1998
B. QUAN

Sincerely,

HARRY Y. YAHATA
District Director

by

for DENIS J. MULLIGAN
District Division Chief
Toll Bridge Program

I concur with the SFOBB East Span Seismic Safety Project alternatives selection criteria and range of alternatives proposed for study by Caltrans.

Signed

5-15-98
Date

FTA
Representing

Enclosure

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY PETE WILSON, Governor

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

May 22, 1998

Ms. Victoria Alvarez
Caltrans Liaison
Regulatory Branch
United States Army Corps of Engineers
333 Market Street
San Francisco, California 94105-2197

File: 04-SF-80-7.6/8.9
04-ALA-80-0.00/1.3
04228-01200K
SFOBB
East Span Seismic Safety Project

Dear Ms. Alvarez:

Subject: SFOBB East Span Seismic Safety Project – Illustration of Alignment Alternatives

Enclosed is an illustration of the various alignment alternatives for the East Span Seismic Safety Project, including alignments considered and withdrawn. This illustration is provided per your request, to assist you in preparing your concurrence on the criteria for alternative selection and the range of alternatives.

The illustration reflects changes in the alternatives since our initial request for concurrence on February 17, 1998. These include one new alignment alternative (N6) and several alignments which have been recently withdrawn from consideration (N1, N3 through N5, and S1). The new alignment alternative, N6, is similar to the alignment alternatives you have already evaluated. It is between N1 and N2, and it results in differences in the roadway geometry and the foundation geology. As a result, although a new alternative is being considered at this time, the overall range of alternatives has not changed: the range of alternatives continues to include the no-build alternative, retrofit of the existing structure, and replacement alternatives to the north and south of the existing bridge.

We look forward to receiving your concurrence. Thank you for your assistance with this important seismic safety project. If you have any questions, please call Marilee Mortenson at (510) 286-6212.

Sincerely,

HARRY Y. YAHATA
District Director

by

Mara Melandry

MARA MELANDRY
SFOBB Environmental Manager
Toll Bridge Program

bc: SHulsebus/PChongchaikit,
MMelandry/MMortenson,
MDavis (Parsons), File

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

REPLY TO
ATTENTION OF:

JUN 04 1998

Regulatory Branch

RECEIVED
JUN 8 1998
B. QUAN

SUBJECT: File No. 230138

DJM

Mr. Dennis Mulligan
California Department of Transportation
111 Grand Avenue
Oakland, California 94623-0660

Dear Mr. Mulligan:

Thank you for your letter dated February 17, 1998, requesting concurrence on the criteria for alternatives selection and range of alternatives to be included in the San Francisco-Oakland Bay Bridge (SFOBB) Seismic Safety Project Draft Environmental Statement (DEIS).

This letter serves as the Corps' concurrence with the criteria for alternative selection and the range of alternatives to be included in the SFOBB Seismic Safety Project Draft DEIS (Attached). We look forward to reviewing a copy of the DEIS when it becomes available.

If you have any questions, please contact Victoria Alvarez, of my staff at 415-977-8472. If you wish to write, please address all correspondence to the District Engineer, Attention: Regulatory Branch, and refer to the file number at the head of this letter.

Sincerely,

Calvin C. Fong
Chief, Regulatory Branch

Enclosures

JUN 18 1998

U.S. Department of Transportation

United States Coast Guard

Commander
Maintenance & Logistics
Command Pacific

Coast Guard Island, Bldg 54D
Alameda, CA 94501-5100
Staff Symbol: sr
Phone: (510) 437-5900
FAX: (510) 437-5753

11011
June 15, 1998

DJM

Mr. Denis Mulligan
Toll Bridge Program Manager
State of California
Department of Transportation
P.O. Box 23660
Oakland, California 94623-0660

RECEI
JUN 18 199
B. QUAN

Dear Mr. Mulligan:

In a meeting we had with representatives of your office on June 3rd, 1998, regarding the new eastern span of the San Francisco - Oakland Bay Bridge we were informed that some alternatives for the location of the temporary ramps on Yerba Buena Island would impact the access to our adjacent Coast Guard facilities. I want you to be aware that any location of these temporary ramps, or other portions of your project, that would limit our safe access to these facilities is unacceptable to the Coast Guard. In any acceptable scenario, our Yerba Buena Island facilities require unrestricted, 24-hour, vehicular access from both San Francisco and Oakland. The Coast Guard's ability to perform its critical missions in the San Francisco Bay Area (search & rescue, vessel traffic control, communications, etc.) must remain unhindered.

If you have any questions regarding this matter please contact me at the address above or (510) 437-5900.

Sincerely,

Robert B. Van de Loo

ROBERT B. VAN DE LOO
Realty Specialist
Maintenance & Logistics Command Pacific
By direction of the Commander

Copy: CG GROUP San Francisco
CG VTS San Francisco
CG Aids to Navigation Team San Francisco
CG MLCPAC (se), (sp)
CG CEU Oakland

EXECU
99 JUN 1

U.S. Department of Transportation
United States Coast Guard

Commander (Pow-2)
Eleventh Coast Guard District

Coast Guard Island
Alameda, CA 94501-5100
Staff Symbol: (Pow-2)
Phone: (510) 437-3514
FAX: (510) 437-5836

16591
San Francisco Bay (8.9)
Ser: 432-98
July 8, 1998

John Schultz
Chief, District Operations
Federal Highway Administration
California Division
980 9th St. Suite 400
Sacramento, CA 95814-2724

Dear Mr. Schultz:

The Coast Guard met with your agency and CalTrans on March 25, 1997 to discuss your letter of March 11, 1998, (encl. 1) in which you agreed to CalTrans request that you assume the role of lead agency status for the San Francisco-Oakland Bay Bridge East Span Replacement Project Project.

Our letters of June 23, 1997, June 24, 1997 and July 15 1997 (encls. 2, 3 and 4) stated that we would be willing to serve as cooperating agency for the replacement. Our letters did not address the contingency, however, that we be listed as cooperating agency if the ultimate decision was to retrofit the bridge. After we commented to CalTrans on July 6, 1998 that we had not been listed as a cooperating agency on the Administrative Draft document for the Seismic Safety project (encl. 5), Ms. Melandry asked us to identify our role for not only the replacement but also the possible retrofit alternatives.

Accordingly, the Coast Guard would be pleased to serve as cooperating agency for East Span Seismic Safety Project in accordance with 40 CFR 1501.6. We must issue a formal bridge permit under Section 9 of the 1899 Rivers and Harbors Act, as amended, for either the replacement or retrofit alternatives being considered. The Coast Guard bridge permit is the federal approval of the location and clearances of a bridge. Our primary consideration is whether the bridge provides safe passage for existing and prospective vessels operating on the waterway. In addition to the permit, we will be involved in the coordination of work evolutions that utilize waterborne equipment or otherwise affect navigational clearances–to minimize impacts navigation.

Our office will also serve as the main point of contact for Coast Guard cooperating agency responsibilities. In that context, we forwarded concerns of our Maintenance and Logistics Command planning and environmental concerns, along with those of our Coast Guard Group San Francisco on Yerba Buena Island as part of our July 6, 1998 letter (encl. 5).

16591
July 8, 1998

If we may be of any assistance, please do not hesitate to contact Mr. Jerry Olmes or me at (510) 437-3514.

Sincerely,

W.R. TILL
Chief, Bridge Section
U. S. Coast Guard
By direction of the District Commander

Encl: (1) Federal Highway Administration letter dated March 11, 1997
(2) My letter dated June 23, 1997
(3) My letter dated June 24, 1997
(4) My letter dated July 15, 1997
(5) My letter dated July 6, 1998

Copy: CalTrans District 04, ATTN Ms. Mara Melandry w/encls

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY PETE WILSON, Governor

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

August 7, 1998

Wayne Till, Chief
Bridge Section
Eleventh Coast Guard district
Building 50-6, Coast Guard Island
Alameda, Ca 94501-5100

File: 04-SF-80-7.6/8.9
04-ALA-80-0.00/1.3
04228-01200K
SFOBB
East Span Seismic Safety Project

Dear Mr. Till:

Subject: East Span Seismic Safety Project –Replacement Alternatives and ADEIS Review

We are writing you and members of the other NEPA/404 MOU signatory agencies to provide an update on the changes to the replacement alternatives for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project. There have been changes to the proposed replacement alternatives as well as the replacement alternatives considered and withdrawn since the time that we received your concurrence on the range of alternatives.

We are also writing to inform you that we will soon send for your information and comment a copy of the Administrative Draft Environmental Impact Statement (ADEIS).

Alternatives:

There have been some changes to the replacement alternatives since most of the NEPA/404 signatories provided concurrence on the range of alternatives. There is one new northern alignment alternative (N6) and one new southern alignment alternative (S4). There are now also several replacement alignments, which have been withdrawn from consideration (N1, N3 through N5, and S1 through S3).

Although two new replacement alternatives have been developed and some previous replacement alternatives have been withdrawn since most of the NEPA/404 signatories provided concurrence on the range of alternatives, the overall range of alternatives has not changed: it continues to include the no-build alternative, retrofit of the existing structure, and replacement alternatives to the north and south of the existing bridge. None of the new replacement alternatives precludes addition of a bicycle-pedestrian path.

The new replacement alternatives, N6 and S4, are similar to the alignment alternatives you have already evaluated. Alternative N6 is between N1 and N2, and it results in improvements in the roadway geometry and the foundation geology. Alternative S4 is similar to S2, and it results in improvements in the roadway geometry as well as shorter temporary detour structures which reduce temporary fill in San Francisco Bay. An enclosure illustrates the alignments.

Administrative Draft Environmental Impact Statement (ADEIS)

We are now preparing the Administrative Draft Environmental Impact Statement (ADEIS). It is targeted for internal distribution beginning August 17, 1998, with public circulation of the Draft Environmental Impact Statement (DEIS) targeted for September. During internal distribution we will send you a copy for your information.

Thank you for your assistance with this important seismic safety project. If you have any questions, please call me at (510) 286-6682.

Sincerely,

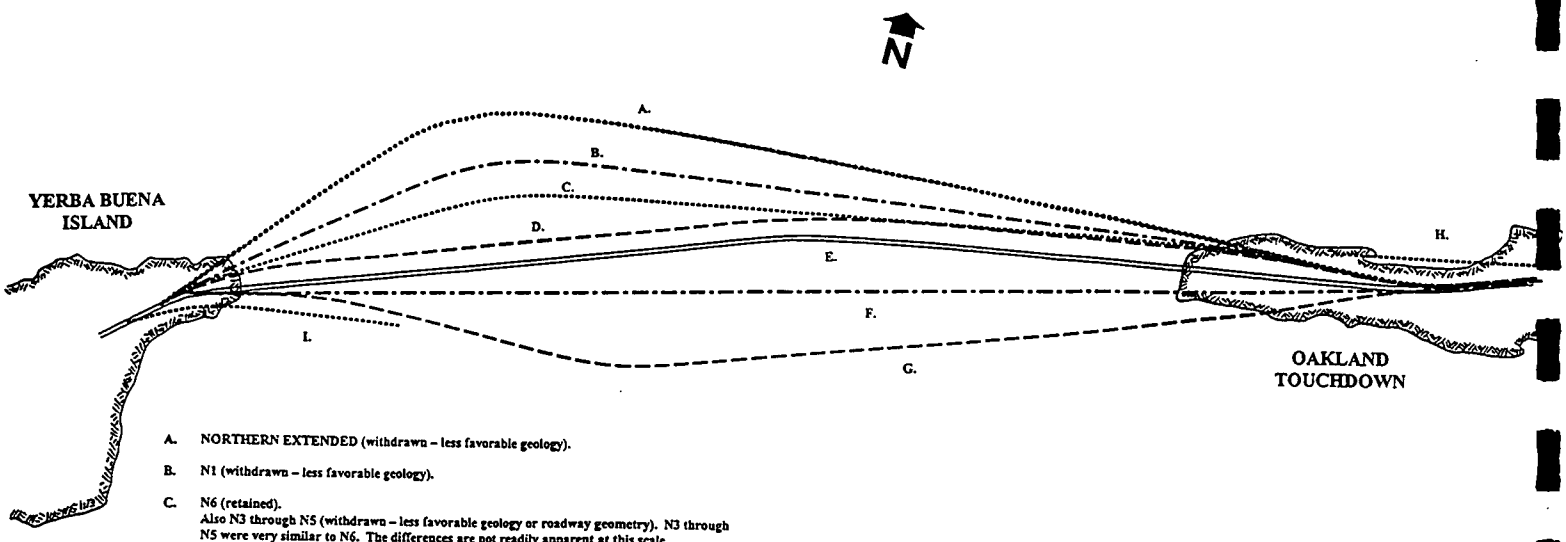
HARRY Y. YAHATA
District Director

by

MARA MELANDRY
SFOBB Environmental Manager
Toll Bridge Program

Enclosure

c: Victoria Alvarez (ACOE), Mark Bartholomew (EPA), Donna Turci (FTA), Chris Mobley (NMFS), Jeff Bielfeldt (USFWS), Bill Wong (FHWA), Dan Harris (FHWA)



A. NORTHERN EXTENDED (withdrawn – less favorable geology).

B. N1 (withdrawn – less favorable geology).

C. N6 (retained).
Also N3 through N5 (withdrawn – less favorable geology or roadway geometry). N3 through N5 were very similar to N6. The differences are not readily apparent at this scale.

D. N2 (retained).

E. EXISTING ALIGNMENT: NO-BUILD AND RETROFIT ALTERNATIVES (retained).

F. S1 (withdrawn – conflicts with East Bay Municipal Utility district's sewer outfall).

G. S2 (withdrawn – less favorable roadway geometry and more temporary fill).
S4 (very similar to S3, difference not apparent at this scale).

H. NORTHERN ALIGNMENT THROUGH RADIO POINT BEACH (withdrawn – impacts to Radio Point Beach). This is not a complete alignment per se. It is a detail variation of the northern alignments.

I SOUTHERN ALIGNMENTS ADJACENT TO TUNNEL EAST POETAL (withdrawn – construction difficulties). These are not complete alignments per se. They are detail variations of the southern alignments.

BAY BRIDGE EAST SPAN PROJECT

Caltrans

SFOBB EAST SPAN SEISMIC SAFETY PROJECT ALIGNMENT ALTERNATIVES, INCLUDING ALIGNMENTS CONSIDERED AND WITHDRAWN

NOT TO SCALE

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY PETE WILSON, Governor

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

August 7, 1998

Mr. Jerry Bielfedlt
U.S. Fish and Wildlife Service
3310 El Camino Way, Suite 130
Sacramento, CA 95821

File: 04-SF-80
04-ALA-80-0.00/1.3
04228-01200K
SFOBB
East Span Seismic Safety Project

Dear Mr. Bielfedlt:

Subject: East Span Seismic Safety Project – Replacement Alternatives and ADEIS

We are writing you and members of the other NEPA/404 MOU signatory agencies to provide an update of the changes to the replacement alternatives for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project. There have been changes to the proposed replacement alternatives as well as the replacement alternatives considered and withdrawn since the time that we received your concurrence on the range of alternatives.

We are also writing to inform you that we will soon send for your information a copy of the Administrative Draft Environmental Impact Statement (ADEIS) to you and the other NEPA/404 signatories.

Alternatives:

There have been some changes to the replacement alternatives since most of the NEPA/404 signatories provided concurrence on the range of alternatives. There is one new northern alignment alternative (N6) and one new southern alignment alternative (S4). There are now also several replacement alignments, which have been withdrawn from consideration (N1, N3 through N5, and S1 through S3).

Although two new replacement alternatives have been developed and some previous replacement alternatives have been withdrawn since most of the NEPA/404 signatories provided concurrence on the range of alternatives, the overall range of alternatives has not changed: it continues to include the no-build alternative, retrofit of the existing structure, and replacement alternatives to the north and south of the existing bridge. None of the new replacement alternatives precludes addition of a bicycle-pedestrian path.

The new replacement alternatives, N6 and S4, are similar to the alignment alternatives you have already evaluated. Alternative N6 is between N1 and N2, and it results in improvements in the roadway geometry and the foundation geology. Alternative S4 is similar to S2, and it results in improvements in the roadway geometry as well as shorter temporary detour structures which reduce temporary fill in San Francisco Bay. An enclosure illustrates the

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Thank you for your assistance with this important seismic safety project. If you have any questions, please call me at (510) 286-6682.

Sincerely,

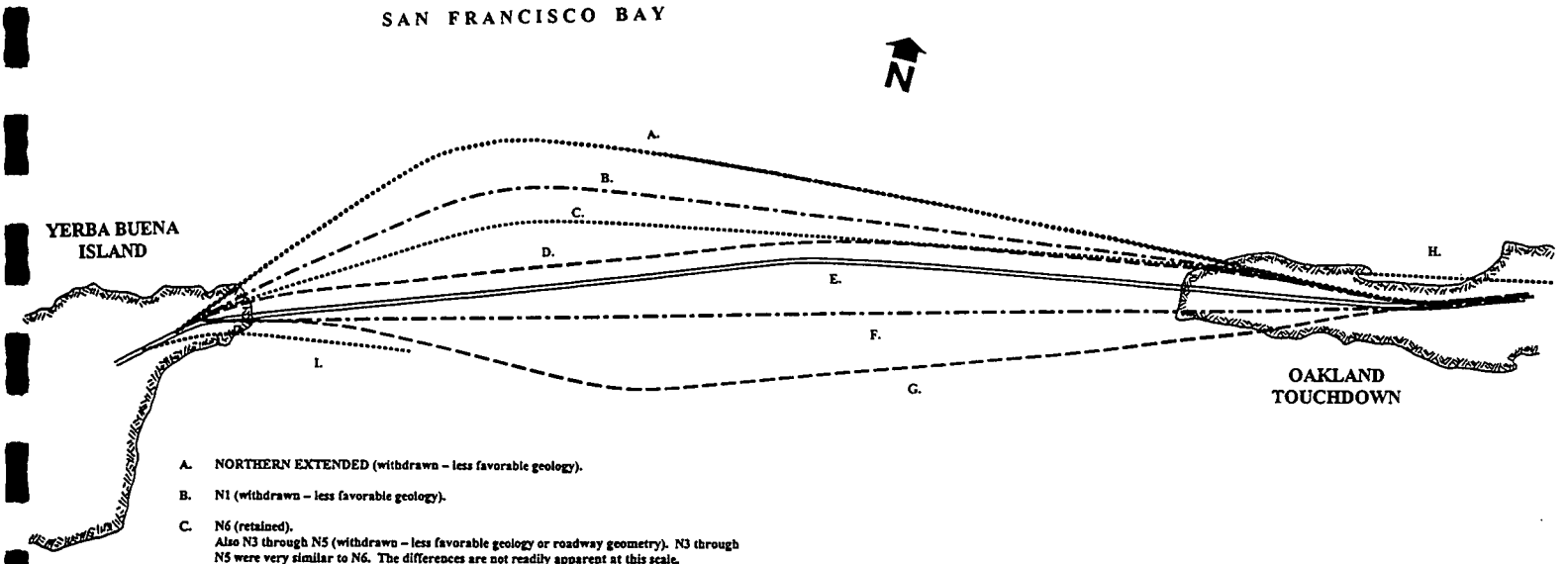
HARRY Y. YAHATA
District Director

by

MARA MELANDRY
SFOBB Environmental Manager
Toll Bridge Program

Enclosure

c: Victoria Alvarez (ACOE), Mark Bartholomew (EPA), Donna Turci (FTA), Chris Mobley (NMFS), Jeff Bielfeldt (USFWS), Bill Wong (FHWA), Dan Harris (FHWA)



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Also N3 through N5 (withdrawn – less favorable geology or roadway geometry). N3 through N5 were very similar to N6. The differences are not readily apparent at this scale.

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BAY BRIDGE EAST SPAN PROJECT

Caltrans

SFOBB EAST SPAN SEISMIC SAFETY PROJECT ALIGNMENT ALTERNATIVES, INCLUDING ALIGNMENTS CONSIDERED AND WITHDRAWN

NOT TO SCALE

AUG 24 1998

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

REPLY TO
ATTENTION OF:

AUG 20 1998

Regulatory Branch

SUBJECT: File Number 23013S

RECEIVED
AUG 24 1998
B. QUAN

Mr. Dennis Mulligan
California Department of Transportation
111 Grand Avenue
Oakland, California 94623-0660

Dear Mr. Mulligan:

Thank you for your letter dated August 7, 1998, regarding the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project (east span replacement). Your letter indicates that there have been changes to the proposed replacement alternatives and several alternatives have been withdrawn from consideration since the Corps transmitted the concurrence letter regarding the range of alternatives pursuant to the Memorandum of Understanding on the National Environmental Policy Act and the Clean Water Act Section 404 Integration Process of 1993 (NEPA/404 Integration Process). Specifically, your letter indicates that two new replacement alternatives (N6 and S4) have been added and that these alternatives are similar to alternatives that the Corps has already evaluated. Your letter also indicates that previous replacement alternatives (N1, N3 through N5 and S1 through S3) have been withdrawn from consideration.

Since there have been changes to the replacement alternatives since the Corps provided concurrence pursuant to the NEPA/404 Integration Process, we would like the opportunity to review and evaluate the range of alternatives now under consideration. The alternative alignment descriptions and mapping provided in your August 7, 1998, letter do not sufficiently describe or depict the new alignment alternatives. A description of the new alternatives along with a graphic showing the location of the alternatives currently under consideration should be provided to our office at your earliest convenience.

Your submittal should describe the configuration of all alternatives currently under consideration. Where replacement alternatives are being considered (replacement alternatives N6 and S4), information on how the new alternatives differ from those previously under consideration should be provided. As noted above, the descriptions should be accompanied by a graphic showing the location of all alternatives currently under consideration. Following our review of your submittal, if there are no additional questions or issues to be discussed, the Corps will provide a revised concurrence letter for the range of alternatives now under consideration in accordance with the NEPA/404 Integration Process.

If you have any questions, please call Victoria Alvarez of our Regulatory Branch at telephone 415-977-8472. Please address all correspondence to the District Engineer, Attention: Regulatory Branch, and refer to the file number at the head of this letter.

Sincerely,

Edward A. Wyle

for Calvin C. Fong
Chief, Regulatory Branch

Copies Furnished:

U.S. EPA, San Francisco (Mark Bartholomew)
U.S. FWS, Sacramento (Mark Littlefield)
U.S. FHWA, San Francisco (Dan Harris)
U.S. FHWA, Sacramento (Bill Wong)
U.S. NMFS, Santa Rosa (Chris Mobely)
U.S. FTA San Francisco (Donna Turci)

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY PETE WILSON, Governor

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

August 27, 1998

Mr. Calvin C. Fong, Chief
Regulatory Branch
United States Army Corps of Engineers
333 Market Street
San Francisco, California 94105-2197

File: 04-SF-80-7.6/8.9
04-ALA-80-0.00/1.3
04228-012000
SFOBB
East Span Seismic Safety Project

Dear Mr. Fong:

Subject: SFOBB East Span Seismic Safety Project –Alignment Alternatives

We received your letter of August 20 requesting an opportunity to review and evaluate the range of alternatives now under consideration for the East Span Seismic Safety Project. To facilitate this, you requested a description of the new alternatives along with a graphic showing the location of the alternatives currently under consideration.

Below is the information that you requested. Additional information may also be found in the Administrative Draft Environmental Impact Statement (ADEIS) for the SFOBB East Span Seismic Safety Project, a copy of which was provided to Ms. Vicki Alvarez, Caltrans Liaison to the Regulatory Branch, on August 17, 1998.

The alignment refinement process has been ongoing since the initial NEPA/404 MOU consultations concerning range of alternatives to be considered. As more engineering information was developed, new alignment alternatives were studied and some alignment alternatives were withdrawn. The alternatives still include a no-build alternative, a retrofit alternative and replacement alternatives. All replacement alternatives under consideration are within the geographic range presented at the initial NEPA/404 meeting, to the north and south of the existing bridge. As agreed to by the NEPA/404 signatories in the concurrence on Purpose and Need, none of the new replacement alternatives precludes addition of a bicycle-pedestrian path. There is no new alternative that proposes a new corridor, a new mode choice, or an expansion of capacity. As with the initial replacement alternative alignments, all new alternatives would consist of two parallel bridge structures.

Along with the discussion below, please see the enclosed Figure 2-3 and Figure 2-10, taken from the ADEIS, which show the proposed replacement alternatives and the replacement alternatives that have been considered and withdrawn.

Proposed Replacement Alternatives

Alternative N-2 is one of the initial replacement alternatives; it is being carried forward. The new replacement alternatives under consideration, N-6 and S-4, are partial refinements of the specific alignment alternatives originally presented to NEPA/404 MOU participants. (See the enclosed Figure 2-3 taken from the ADEIS.)

- **Replacement Alternative N-2** would construct a 3,585-meter (11,759-foot) long new bridge north of the existing East Span and dismantle the existing structure. The N-2 alignment parallels the existing bridge and maintains minimal clearance between the old and new structures to accommodate constructing the new bridge and dismantling the existing structure.

- **Replacement Alternative N-6** would construct a 3,620-meter (11,877-foot) long new bridge north of the existing East Span and dismantle the existing structure. The N-6 alignment represents a continuation of design refinements to Alternative N-1 to maximize panoramic vistas of the San Francisco and East Bay hills, avoid unstable Bay bottom geologic conditions, and set an alignment placing a signature span tower as close to Yerba Buena Island (YBI) as possible.

  The Alternative N-6 alignment differs from other northern alignments only slightly, being located south of the N-1 alignment and north of the N-2 alignment. The modification to the alignment resulted from 1) positioning the alignment and signature span tower location to take advantage of relatively shallow depths to bedrock and 2) application of a 900-meter (3,000–foot) radius horizontal curve between the YBI viaduct and the tangent section in which a signature span would be located. Application of this reduced curve radius allows for an alignment that provides somewhat lessened but still dramatic scenic views and minimizes intrusion into areas of deep Bay muds to the north of the existing bridge. This alignment modification was informed by results of detailed in-Bay geotechnical studies that provided more detailed mapping of Bay bottom conditions than when Alternative N-1 was defined.

  As with all northern alignment considered, the skyway portion of the alignments would be similar and would reach the Oakland Touchdown area at approximately the same location.

- **Replacement Alternative S-4** would construct a 3,550-meter (11,644-foot) bridge south of the existing East Span and dismantle the existing structure. The S-4 alignment was developed to minimize bridge length and to avoid use of flat land to the north of the existing East Span on YBI while attempting to avoid conflicts with the alignment of the EBMUD sewer outfall south of the existing East Span. The S-4 alignment uses the same horizontal curve radius between the YBI East Viaduct and the signature span applied to the N-6 alignment. As a result, Alternative S-4 would allow for the placement of a signature span tower closer to YBI than possible with Alternative S-2 and eliminate the need to construct long temporary detour structures over Bay waters.

  The skyway portion of the S-4 alignment is the same as the skyway portion of the S-2 alignment and reaches the Oakland Touchdown area at the same location.

Replacement Alternatives Considered and Withdrawn

Alternatives N-1, N-3 through N-5 and S-1 through S-3 referenced in your letter dated August 20, 1998 are alignment alternatives developed in response to new, detailed geologic data. These alignment alternatives also were defined to test engineering designs attempting to respond to seismic safety and traffic operational issues referenced in the project Purpose and Need statement. (See the enclosed Figure 2-10 taken from the ADEIS).

The rationale for withdrawal of alignment alternatives is presented in the summary below:

- Alternative N-1 – Based on results of geologic studies, it was determined that approximately one-half of the N-1 alignment would fall within areas of deep young Bay mud, which would potentially decrease seismic performance of the structure and increase construction cost. Given considerations of construction complexity, schedule, construction cost and reduced seismic performance, it was recommended for withdrawal.
- Alternative N-3 – This alignment study looked at placing the signature span tower near the YBI shore to take advantage of shallow depths to bedrock. However, the requirement for a tangent, or straight, section for a signature span would have forced curves between the YBI East Viaduct and the signature span that would not meet American Association of State Highway and Transportation Officials (AASHTO) standards. A mandatory design exception from FHWA would have been required. This alignment was dropped from consideration.
- Alternative N-4, a refinement of Alternative N-3, presented a trade-off between signature span location and roadway geometric design. The alignment would not require design exceptions, but the tower location would have been forced into deep water locations within the navigation channel, where tower construction would be more complex. Based on increased complexity of tower construction, Alternative N-4 was withdrawn from further consideration.
- Alternative N-5 was an additional alignment refinement seeking to define an acceptable trade-off between roadway geometrics and signature span tower location. The N-5 alignment provided a large radius curve that would avoid sight distance issues but would not allow for a tangent roadway section approaching the YBI tunnel. Tower location would remain in deep water. Based on less than optimal location of the tower and the roadway geometrics, Alignment N-5 was withdrawn from further consideration in favor of Alternative N-6.
- Alternative S-1 was originally defined as the most direct replacement alignment between YBI and the Oakland Touchdown area. However, the alignment would require an in-Bay crossing of the East Bay Municipal Utility District (EBMUD) sewer outfall. EBMUD determined that an underwater transverse crossing of the outfall was not feasible. This alignment would require relocation of the sewer outfall. Cost to relocate the outfall was estimated to be in excess of $100 million and would require its own environmental review separate from the East Span Project. Based on these considerations, Alternative S-1 was withdrawn from further consideration.

File: 04-SF-80-7.6/8.9
04-ALA-80-0.00/1.3
04228-012000
SFOBB
East Span Seismic Safety Project

- Alternative S-2 was originally defined as an alignment that would avoid the EMBUD sewer outfall and provide a roadway alignment that would not require FHWA design exceptions. However, geometric constraints of the tunnel and YBI East Viaduct approach forced the signature span tower location into deep water. Temporary detour structures required at YBI to transition traffic from the existing span to the replacement bridge would need to extend into the Bay. Further engineering evaluation of these detour structures raised concerns for the structural integrity of the existing East Span cantilever section. Therefore, Alternative S-2 was withdrawn from further consideration.
- Alternative S-3 represents a continuation of south alignment design refinements. It is a refinement of Alternative S-1 at Yerba Buena Island. Like S-1, it has an in-Bay crossing of the EBMUD sewer outfall. The S-3 alignment studied modifications of roadway geometrics approaching the YBI tunnel. However, the resulting design would have required a deep water tower location and the use of temporary detour structures connecting to the existing cantilever section. Based on concerns for the structural integrity of the existing bridge and the need for a transverse crossing of the EBMUD outfall, Alternative S-3 was withdrawn from consideration in favor of Alternative S-4.

This summarizes the proposed replacement alternatives and the alternatives considered and withdrawn. We appreciate any efforts your agency can make to review this information and provide a revised concurrence letter at your earliest convenience. Caltrans' target date for circulation of the Draft Environmental Impact Statement is September 17, 1998.

If you need additional information or have any questions, please call Marilee Mortenson at (510) 286-6212 immediately, and she will provide what you need to complete your review and evaluation.

Sincerely,

HARRY Y. YAHATA
District Director

by

Mara Melandry

for DENIS J. MULLIGAN
District Division Chief
Toll Bridge Program

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
3310 El Camino Avenue, Suite 130
Sacramento, California 95821-6340

IN REPLY REFER TO:
PPN 2419

September 1, 1998

Mara Melandry - Environmental Manager
Caltrans District 4
111 Grand Avenue,
Oakland, California 94623-0660

Subject: Administrative Draft Environmental Impact Report/Statutory Exemption for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project

Dear Ms. Melandry:

The U.S. Fish and Wildlife Service (Service) has reviewed the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project (SFOBB) Administrative Draft Environmental Impact Report/Statutory Exemption (ADEIS), dated August 17, 1998, regarding a proposal to upgrade the existing East Span of the San Francisco-Oakland Bay Bridge. Our comments are provided pursuant to the 1994 Memorandum of Understanding on Integration of the National Environmental Policy Act and Clean Water Act Section 404 Procedures for Surface Transportation Projects and are intended to assist you in your review of the proposed project. These comments will not take the place of any formal comments that may be required at a later date pursuant to the Fish and Wildlife Coordination Act (FWCA) or the Endangered Species Act of 1973, as amended (Act).

GENERAL COMMENTS

The ADEIS evaluates Caltrans proposal to upgrade the existing East Span of the San Francisco-Oakland Bay Bridge. Under provisions of the FWCA, the Service advises the U.S. Army Corps of Engineers (Corps) on projects involving dredging and fill activities in "waters of the United States," and special aquatic sites, which include wetlands such as those found on the proposed project site. Since the proposed project will require a Corps permit, pursuant to Section 404 of the Clean Water Act, the Service will provide comments to the Corps under FWCA authority. When reviewing public notices, the objectives of the Service are: "Ensuring that all authorized works, structures, and activities are (1) judged to be the least ecologically damaging alternative or combination of alternatives (e.g., all appropriate means have been adopted to minimize environmental losses and degradations) and (2) in the public's interest in safeguarding the environment from loss and degradation." (Federal Register, Vol. 40, No. 231, December 1, 1975).

When projects impacting waterways or wetlands are deemed acceptable to the Service, we recommend full mitigation for any impacts to fish and wildlife. The Council on Environmental Quality regulations for implementing the National Environmental Policy Act define mitigation to

include: 1) avoiding the impact; 2) minimizing the impact; 3) rectifying the impact; 4) reducing or eliminating the impact over time; and 5) compensating for impacts. The Service supports and adopts this definition of mitigation and considers the specific elements to represent the desirable sequence of steps in the mitigation planning process.

Because of their high value to migratory birds, and their ever-increasing scarcity in California, our mitigation goal for wetlands (including mudflats and eelgrass beds) is no net loss of in-kind habitat value or acreage (whichever is greater)

The proposed alternatives will have relatively minor impacts to wetland resources. Impacts range from no loss of acreage associated with the No-Action and Retrofit alternatives; to losses of 0.07 acre of wetlands, 0.15 acre of mudflats, and 0.075 acre of eelgrass beds associated with the southern alternative (Alternative S-4). While the quantities are small, the Service's mitigation goal for wetlands, as stated above, is no net loss of in-kind habitat value or acreage.

The Service advises Caltrans to examine compensatory mitigation sites in the vicinity of impact sites. Mitigation areas constructed adjacent to impact sites will benefit local wildlife and/or fisheries resources. We encourage Caltrans to examine the potential of providing compensatory mitigation in the areas of the Oakland touch down (Oakland side of the SFOBB proposal), or the Port of Oakland because of their potential to augment the high value wildlife habitat of the Emeryville Crescent. The Oakland touch down and Port of Oakland areas also have the potential for continued success without extensive management.

To adequately compensate for any loss of habitat function or value due to temporal losses, we recommend a mitigation ratio of 3:1 for losses associated with wetlands and special aquatic sites. This recommendation is based on habitat evaluations conducted for similar projects within the Bay Area.

We appreciate Caltrans' coordination efforts and the opportunity to provide input during this stage of planning. If you have any questions regarding our comments, or require further information, please contact Jerry Bielfeldt in the Wetlands Branch at (916) 979-2113.

Sincerely,

for Wayne S. White
Field Supervisor
U.S. Department of the
Interior Coordinator

cc: AES, Portland, OR

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

REPLY TO
ATTENTION OF:

SEP 0 3 1998

RECEIVED
SEP 4 - 1998
B. QUAN

Regulatory Branch

SUBJECT: File Number 23013S

DJM

Mr. Dennis Mulligan
California Department of Transportation
111 Grand Avenue
Oakland, California 94623-0660

Dear Mr. Mulligan:

Thank you for your letter dated August 27, 1998, providing updated information on the range of alternatives currently under consideration for the San Francisco-Oakland Bay Bridge (SFOBB) East Span Seismic Safety Project pursuant to the NEPA/404 Integration Process Memorandum of Understanding (MOU). The Corps provided concurrence on the range of alternatives by letter dated June 8, 1998. In an August 7, 1998 letter, you informed the Corps that two new replacement alternatives (N6 and S4) were added and that several alternatives (N1, N3 through N5 and S1 through S3) were withdrawn from consideration. By letter dated August 20, 1998, the Corps requested that Caltrans provide information describing all alternatives currently under consideration as well as a graphic showing the location of these alternatives. The requested information was provided as an attachment to your August 27, 1998 letter.

The Corps has reviewed the information provided in your August 27, 1998 letter. The information adequately describes and depicts the project alternatives currently under consideration. Therefore, this letter serves as the Corps' concurrence on the revised range of alternatives pursuant to the NEPA/404 Integration Process MOU (Attachment 1). It is the Corps' understanding that the alternatives described will be further described in the project Draft Environmental Impact Statement (DEIS).

We look forward to continuing the NEPA/404 Integration Process for this project. It is the Corps' understanding that our next decision/discussion points will include verification of the jurisdictional determination and identification of the final EIS NEPA preferred/section 404 least environmentally damaging practicable alternative.

If you have any questions, please contact Victoria Alvarez, of our Regulatory Branch at 415-977-8472. If you wish to write, please address all correspondence to the District Engineer, Attention: Regulatory Branch, and refer to the file number at the head of this letter.

Sincerely,

Calvin C. Fong
Chief, Regulatory Branch

Enclosures

Copies Furnished:

U.S. EPA, San Francisco CA (Mark Bartholomew)
U.S. FWS, Sacramento, CA (Mark Littlefield)
U.S. FHWA, San Francisco, CA (Dan Harris)
U.S. NMFS, Santa Rosa, CA (Chris Mobely)
U.S. CG, Oakland, CA (Jerry Olmes)
U.S. FTA, San Francisco, CA (Donna Turci)

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

REPLY TO
ATTENTION OF:

Regulatory Branch

SUBJECT: File Number 23013S

Mr. Dennis Mulligan
California Department of Transportation
111 Grand Avenue
Oakland, California 94623-0660

Dear Mr. Mulligan:

Thank you for your submittal of August 17, 1998, requesting confirmation of the extent of Corps of Engineers jurisdiction at within the project boundary of the San Francisco-Oakland East Span Seismic Safety Project located in San Francisco and Alameda Counties, California. Victoria Alvarez, of my staff, met with Jennifer O'Connell of Woodward-Clyde Consultants and Beverly McIntosh of the California Department of Transportation (Caltrans) on August 27, 1998, to review the delineation. A second field inspection was performed on September 3, 1998 to review previously undelineated wetland areas on the eastern end of the project.

Enclosed is a map showing the extent and location of Corps of Engineers jurisdiction within the project boundary. We have based this jurisdictional delineation on the current conditions of the site. A change in those conditions may also change the extent of our jurisdiction. This jurisdictional delineation will expire in five years from the date of this letter. However, if there has been a change in circumstances which effects the extent of Corps jurisdiction, a revision may be done before that date.

All proposed work and/or structures extending bayward or seaward of the line on shore reached by: (1) mean high water (MHW) in tidal waters, or (2) ordinary high water in non-tidal waters designated as navigable waters of the United States, must be authorized by the Corps of Engineers pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403). Additionally, all work and structures proposed in unfilled portions of the interior of diked areas below former MHW must be authorized under Section 10 of the same statute.

All proposed discharges of dredged or fill material into waters of the United States must be authorized by the Corps of Engineers pursuant to Section 404 of the Clean Water Act (CWA) (33 U.S.C. 1344). Waters of the United States generally include tidal waters, lakes, ponds, rivers, streams (including intermittent streams), and wetlands.

Your proposed work appears to be within our jurisdiction and a permit is required. Application for Corps authorization should be made to this office using the application form in the enclosed pamphlet. To avoid delays it is essential that you enter the file number at the top of this letter into Item No. 1. The application must include plans showing the location, extent and character of the proposed activity, prepared in accordance with the requirements contained in this pamphlet. You should note, in planning your work, that upon receipt of a properly completed application and plans, it may be necessary to advertise the proposed work by issuing a public notice for a period of 30 days.

Since an individual permit is required, it will be necessary for you to demonstrate to the Corps that your proposed fill is necessary because there are no practicable alternatives, as outlined in the U.S. Environmental Protection Agency's Section 404(b)(1) Guidelines. A copy is enclosed to aid you in preparation of this alternative analysis.

If you have any questions, please call Victoria Alvarez of our Regulatory Branch at telephone 415-977-8472. Please address correspondence to the District Engineer, Attention: Regulatory Branch, and refer to the file number at the head of this letter.

Sincerely,

Calvin C. Fong
Chief, Regulatory Branch

Enclosure

APPENDIX G
AGENCY CONSULTATION LETTERS

APPENDIX G
Agency Consultation Letters

List of Letters

From	To	Date
Mayor of San Francisco	MTC Bay Bridge Design Task Force	6/12/1997
U.S. Fish and Wildlife Service	U.S. Coast Guard	6/24/1997
Mayor of San Francisco	MTC Bay Bridge Design Task Force	7/21/1997
Caltrans	National Marine Fisheries Service	8/18/1997
Caltrans	U.S. Fish and Wildlife Service	8/18/1997
National Marine Fisheries Service	Caltrans	8/26/1997
U.S. Fish and Wildlife Service	Caltrans	8/29/1997
Mayor of San Francisco	Governor, State of California	9/5/1997
Mayor of San Francisco	Caltrans	9/5/1997
Mayor of San Francisco	Caltrans	11/1997
Caltrans	Mayor of San Francisco	12/17/1997
Oakland Landmarks Preservation Advisory Board	Caltrans	1/14/1998
Caltrans	Oakland Landmarks Preservation Advisory Board	2/11/1998
Mayor of San Francisco	MTC Bay Bridge Design Task Force	5/13/1998
U.S. House of Representatives (Bay Area Members)	Metropolitan Transportation Commission	6/11/1998
Caltrans	San Francisco Bay Conservation and Development Commission	6/12/1998
Mayor of San Francisco	MTC Bay Bridge Design Task Force	6/22/1998
U.S. Navy	Caltrans	7/16/1998
Port of Oakland	Bay Relations, Inc.	8/10/1998
State Senator Quentin Kopp	Metropolitan Transportation Commission	8/10/1998
U.S. Coast Guard	Caltrans	8/12/1998
Office of Historic Preservation	Federal Highway Administration	8/13/1998
Metropolitan Transportation Commission	State Senator Quentin Kopp	8/17/1998
Federal Highway Administration	Caltrans	8/18/1998
Office of Historic Preservation	Caltrans	8/21/1998
Caltrans	National Marine Fisheries Service	9/1/1998
Office of Historic Preservation	Federal Highway Administration	9/10/1998

ATTACHMENT #3

OFFICE OF THE MAYOR
SAN FRANCISCO

WILLIE LEWIS BROWN, JR.

June 12, 1997

Honorable Mary King
Chairperson
Bay Bridge Design Task Force
Metropolitan Transportation Commission
101 Eighth Street
Oakland, CA 94607-4700

Dear Supervisor King:

Thank you for serving as Chair for the Bay Bridge Design Task Force. I appreciate the effort that MTC and Caltrans have put into this aggressive review and study period. I am taking the liberty of writing the Task Force with my thoughts regarding the future of the Bridge, its connectivity to the region and its impact on San Francisco.

As you know, San Francisco views the Bay Bridge in its totality, not just the eastern span. Efforts should be made to support the retrofit of the western approach ramps, redesign of the access to Yerba Buena Island and Treasure Island, as well as the incorporation of the new regional terminal which will help relieve future congestion on the new span and the transbay corridor.

Last month City staff presented to your Committee information regarding the replacement of the state-owned Transbay Transit Terminal, which is historically linked to the Bay Bridge. The Terminal has been part of the Bridge since its inception, toll revenues paid for its construction, and continue to pay for its operation and maintenance. Caltrans, faced with seismic and life safety concerns regarding the future of the terminal, came to the City for assistance in planning a replacement facility. The City of San Francisco, working with the regional transit operators, MTC and Caltrans has developed a replacement terminal proposal. This proposal was endorsed by the San Francisco Board of Supervisors last month and is moving into project design and environmental review. I am attaching a copy of a letter I sent to the President of AC Transit's Board of Directors outlining the history of this project.

The primary user of the Transbay Transit Terminal is AC Transit, which enjoys exclusive ramp access from the Bridge to the Terminal. This dedicated access allows for efficient, convenient transbay access from the East Bay. This exclusive access will continue as part of the replacement terminal to be located between Main and Beale Streets at Howard Street.

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(415) 554-6141
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Access to and from the Bridge should also be considered in your final analysis on the Bridge. I know there are efforts to retrofit and or replace the western approach ramps, which include the terminal ramps, leading to and from the Bridge in San Francisco. The coordination of this project as it relates to the rebuilding of the Terminal Separator Structure should be encouraged. However, I believe the greatest deficiency is related to the auto ramps linking the Bridge with Treasure Island and Yerba Buena Island (TI/YBI). From an operational and life safety standpoint, I assume these ramps are sub-standard. One cannot in good conscience allow the bridge to be retrofitted and do nothing to improve how vehicles get on and off the Island. The Task Force should support the additional costs required to assure safe and convenient traffic movement between the Bridge and TI/YBI.

The alignment of the eastern span onto Yerba Buena Island is also critical to us as we take possession of the Island from the Navy this fall. The proposed Northern alignment precludes development of most of the flat, developable land on Yerba Buena Island. Reuse of existing buildings and redevelopment of this area is critical to providing revenue to fund redevelopment of Treasure Island, where seismic safety issues and Tideland Trust restrictions impose higher costs for redevelopment. For this reason, along with the increased cost for the replacement span, I am against the Northern alignment. The Southern alignment preserves these immediately developable opportunities, reduces negative visual and noise impacts from the existing Bridge, and costs less.

I hope that you find this information helpful in your deliberations regarding the new Bay Bridge design. I offer my good offices to assist you in obtaining additional funding for those proposals endorsed by your Task Force. Thank you for allowing me the forum to comment.

Sincerely,

Willie L. Brown, Jr.
Mayor

WLB:s2

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Sacramento Field Office
3310 El Camino Avenue, Suite 130
Sacramento, California 95821-6340

IN REPLY REFER TO:

1-1-97-F-107

June 24, 1997

Mr. W.R. Till
Chief, Bridge Section
U.S. Coast Guard
Bldg. 50-6 Coast Guard Island
Alameda, CA 94501-5100

Subject: Formal Section 7 Consultation on the Oakland Bay Bridge Seismic Retrofit, San Francisco and Alameda Counties, California

Dear Mr. Till:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on the Service's review of the proposed Oakland Bay Bridge (Bridge) seismic retrofit and related activities, and its effects on the endangered American peregrine falcon (*Falco peregrinus anatum*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act). Your request for formal consultation was received on January 3, 1997.

This biological opinion is based on information provided in the November 7, 1996, biological assessment (BA) prepared by Caltrans (1996), personal communications with Brian Walton of the Santa Cruz Predatory Bird Research Group (SCPBRG), the final rule listing the peregrine falcon (35 CFR 16047), the proposed rule to delist the species (50 CFR 34406), and the Recovery Plan for the Peregrine Falcon (USFWS 1982). A complete administrative record of this consultation is on file in this office.

BIOLOGICAL OPINION

Description of the Proposed Action

The U.S. Coast Guard proposes to authorize the California Department of Transportation (Caltrans) to proceed with a seismic retrofit of the Oakland Bay Bridge. The seismic retrofit will occur through 21 individual projects, as described in the biological assessment. The projects are grouped into units: east bay, west bay, and the west bay approach. Project 1, at the east bay approach, is currently under construction. Project 11 is at the west bay approach and is completed. Project 21 has been included in Project 3. This biological opinion addresses the remaining 18 projects. In summary, the remaining projects that may affect the peregrine falcon involve foundation work on the footings of several piers and work on the superstructures, road beds and footings of over-water portions of the bridge. For a complete description of project activities, refer to the biological assessment (Caltrans 1996).

Project impacts will be minimized by implementing a construction restraint from February through mid-June. In addition, any peregrine falcon chicks will

be removed by the SCPBRG. Chicks will be reared and released elsewhere. Activities will avoid a 300 foot distance from the actual nest locations.

Species Account and Environmental Baseline

The American peregrine falcon was federally listed as endangered in 1970 (35 FR 16047). The following is a discussion of peregrine falcon biology, population status and trends. For further information refer to the *Pacific Coast Recovery Plan for the American Peregrine Falcon* (USDI 1982)

As stated in the *Pacific Coast Recovery Plan for American Peregrine Falcon* (USDI 1982), American peregrine falcons nest almost exclusively on cliffs, usually near water. Preferable sites are sheer cliffs 150 feet or more in height. The cliff usually has a small cave or overhung ledge large enough to contain three or four full-grown nestlings. Several holes or ledges that can be used in alternate years are apparently not an absolute requirement, but probably increase the suitability of the cliff. Peregrines have nested from sea level to over 11,000 feet, anywhere suitable cliffs are found, except in the desert.

Bridges and tall buildings have become surrogate cliffs and are utilized by peregrine pairs for nesting, roosting and foraging (Hickey and Anderson 1969). Peregrines' use of bridges includes (1) year round occupation, with the bridges used as hunting perches, night roosts, perches to escape inclement weather, or other perching, (2) nesting by pairs from 1 February through 31 July, and (3) irregular occupation by immature peregrines, "floating" adults seeking vacant territories, or wintering migrants from northern populations (Walton 1997). In the case of nesting pairs, no nest is built by the falcons; eggs are laid in debris on ledges or in cavities (Walton 1997). Nest sites are almost invariably below the roadway, and often on the portion of the bridge that is highest above the water. These latter "sites" can be repeated many times on any one bridge. Typically, only one pair will occupy a bridge (Walton 1997).

Peregrines compete with other raptors and ecologically similar birds for cliff nests. For example, golden eagles (*Aquila chrysaetos*), red-tailed hawks (*Buteo jamaicensis*), prairie falcon (*Falco mexicanus*), turkey vultures (*Cathartes aura*), and ravens (*Corvus corax*) all nest in similar situations and may even use abandoned peregrine eyries. Peregrines defend the nesting territory vigorously against intrusion by some of these species. It is not clear, however, if this is a response to nest-site competition or is a response of perceived threats to adults or young.

Availability of nest sites may be a limiting factor in some areas. For example, peregrines historically nested all along the coast in southern California. Today, houses and other buildings are located on the tops of these sea cliffs, and recreation abounds in their vicinity to such an extent that few suitable nesting areas remain. Partly as a result of this, peregrine falcons currently do not nest along the coast from near Santa Barbara south to the Mexican border. Further loss of historical peregrine nest sites could limit recovery of the species in some areas.

Foraging areas are associated with each nest territory. This generally includes wooded areas, marshes, open grasslands, coastal strands and bodies of water. The peregrine falcon is a diurnal raptor that feeds almost entirely on small birds. Wooded areas near water attract a diverse avifauna, and bodies of water provide open areas where prey cannot easily escape attack. Marshes, savannas, and shorelines are also common foraging areas. Loss of foraging

areas through modification of habitat may be a problem. In many areas human encroachment has caused nests to be abandoned, but it is difficult to separate the effects of habitat loss from the effects of disturbances to the birds themselves.

The species suffered a dramatic population crash in the 1960s correlated with the introduction and use of organo-chlorine pesticides in the middle and late 1940s. About 220 historical eyries were known in California. By 1970, only four nesting locations in California were active. By the mid 1970s, the remaining core population in the State was estimated to be 20 to 30 pairs in the inner north coastal ranges, with 5 to 10 pairs distributed throughout the rest of the State.

A Recovery Plan for the species was adopted in 1982. Under the plan, the first phase allowed various techniques to be used to increase the peregrine falcon populations. In the San Francisco Bay Area, researchers from the SCPBRG coordinated egg removals, fostering, cross fostering and captive breeding efforts. American peregrine falcons in the western United States have re-expanded in recent decades. In 1992, 113 pairs were known in California, most of which occurred in the northwestern portion of the State. On June 30, 1995, the Service published an advance notice of a proposal to remove the American peregrine falcon from the list of Endangered and Threatened wildlife (50 FR 34406); according to this notice, the current total for the Pacific population stands at approximately 224 pairs.

There are currently several pairs of peregrine falcons within the vicinity of the Oakland Bay Bridge. The Dumbarten Bridge supports nesting peregrine falcons (B. Walton, pers. comm., 1997), peregrines have been observed utilizing the Hayward-San Mateo Bridge for perching and foraging, and nesting attempts have been documented at the Richmond-San Rafael Bridge (Caltrans 1997). The Oakland Bay Bridge has two pairs of nesting peregrine falcons; one pair nests on the west bay spans and another pair nests on the east bay side. The biological assessment provides nest histories of both pairs from the 1980s through the 1996 breeding season (Caltrans 1996).

Effects of the Action

A review of the literature indicates that disturbance can negatively affect avian productivity. Specifically, studies on waterfowl, colonial seabirds and raptors have shown that disturbance can cause nest abandonment, egg mortality due to exposure from flushing, increased predation of eggs and hatchlings, depressed feeding rates, increased adult energy demands, or avoidance of otherwise suitable habitat (Anderson and Keith 1980, Burger 1981, Pierce and Simons 1986, Knight and Skagen 1988, Henson and Grant 1991). Recurring disturbance, such as annual events, may cause a shift in breeding activity over time. Individuals that succeed in their reproductive efforts in spite of noise disturbance may not return to the same successful location the following year due to anticipated disturbance.

The use of motorized equipment during the breeding season within one half mile of suitable nesting habitat has the potential to disrupt essential breeding behaviors by: (1) causing abandonment of the breeding effort by failure to initiate nesting; (2) copulation disturbances resulting in infertile eggs; (3) causing abandonment of the breeding effort by failure to complete incubation; (4) egg breakage or death; (5) death of young in the nest because of inability to thermoregulate; (6) disrupting nesting activities such as feeding young; (7) causing premature fledging and dispersal of juveniles;

(8) stress to adults resulting in less hunting and starvation of young; and
(9) various other impacts.

The effects of disturbances on peregrine falcons vary with the timing of the disturbance and the proximity to the eyrie. The peregrine falcon is particularly sensitive to disturbance near the nest cliff during the breeding season. In early spring during courtship, disturbed birds are particularly liable to desert an area. Part of the male's courtship ritual involves ledge displays to attract a female to a particular ledge for use as a nest site (Nelson 1970). The female will accept or reject the ledge, and it is believed that this is based largely on the protection from predators the ledge offers. If disturbance occurs near the ledge, the female will often reject the ledge and search for a better one. If human activities are centered generally throughout the nesting area, the entire territory may be abandoned, and the pair may not nest (Hickey 1942, Bond 1946, Fyfe and Olendorff 1976). Peregrines have abandoned their nest ledges after a single short visit by a human before or during egg laying (Fyfe and Olendorff 1976).

After the eggs are laid, the parents are less likely to abandon their nest, but many still do so. After the eggs hatch, but before the young fledge, the parents are most likely to "sit tight" and defend the nest vigorously rather than abandon it. Another critical period occurs just prior to fledgling by the young. Disturbance at the nest may cause the nestlings to fledge prematurely, which may result in injury or death, or expose them to predators.

The birds utilizing San Francisco Bay area bridges, such as the Oakland Bay Bridge, may be accustomed to higher levels of noise disturbances than other birds nesting within the range. However, the construction activities are expected to increase noise levels and visual distractions to a higher degree than that associated with typical road and boat traffic. Disturbances to peregrine falcons on the Oakland Bay Bridge have been documented in association with past bridge repair work. The pairs on the bridge have defended their nest areas, during their reproductive period, by mobbing intruders and vocalizing. Disturbances other than retrofit activities, such as bridge inspections, maintenance and painting are continuous and therefore, represent a high degree of disturbance to the birds. Other retrofit construction projects (i.e., Richmond-San Rafael Bridge, Hayward-San Mateo Bridge) occurring simultaneously within the San Francisco Bay area may increase the cumulative effects on peregrine falcons.

Peregrines rarely return to their own nest to breed with their parents or siblings, instead most move 10 to 250 miles and breed with unrelated birds (Walton 1997). Thus, falcons coming to California bridges in the future are unlikely to be offspring fledged from nests on the bridge being impacted. This means that the productivity of an individual bridge is not critical to continued occupancy of that specific territory or bridge. Hence, bridges have remained occupied now for many years despite higher than normal mortality of fledglings that occurs because of drowning and car collisions. For this reason, moving broods to hack sites has been suggested by some biologists as a way to salvage young peregrines and allow them to fledge under safer conditions.

Hacking of peregrine falcons, as committed to by Caltrans via their contract with the SCPBRG, will greatly enhance peregrine productivity and re-occupancy of many areas of historic range in California. According to Walton (pers. comm. 1997), almost all birds on buildings and bridges initially came from these releases, although currently most falcons come from wild nests. In

addition to hacking of young birds, the limited operating period and 300 foot avoidance zone will further minimize the effects of incidental take.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur within the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Conclusion

After reviewing the current status of the American peregrine falcon, the environmental baseline, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the seismic retrofit of the Bridge, as proposed, is not likely to jeopardize the continued existence of the peregrine falcon. This determination is based on implementation of the conservation measures to minimize harm that are outlined in your biological assessment.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns, including breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

Amount or Extent of Take

The Service has determined that incidental take of reproduction associated with the peregrine falcon territories within the vicinity of the Bridge is likely to occur throughout the project duration (3 years). The Service estimates that all progeny from one nesting pair of peregrine falcons will be subject to take in the form of harm, harassment, or capture for a period of three years.

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the American peregrine falcon or a reduction of opportunity for recovery of the species.

Reasonable and Prudent Measures

The Service determines that no reasonable and prudent measures are necessary to minimize the impact of incidental take of peregrine falcons. The Coast Guard, however, has a continuing duty to regulate the activity covered by this incidental take statement. If the Coast Guard fails to require the applicant to adhere to the measures proposed in the project description, the protective coverage of section 7(o)(2) may lapse.

Reporting Requirements

The Service has an established protocol for the handling and analysis of dead, sick or injured listed species. Any dead or injured peregrine falcons must be reported to the Service's Law Enforcement Division (916/979-2986) within 24 hours, and turned over as soon as possible to the Law Enforcement Division or to a game warden or biologist of the California Department of Fish and Game for care or analysis. The Service is to be notified in writing within three working days of the accidental death of, or injury to, any peregrine falcon, or of the finding of any dead or injured peregrine falcon during construction operations. Notification must include the date, time, and location of the incident or discovery of a dead or injured peregrine falcon, as well as any pertinent information on circumstances surrounding the incident or discovery. The Service contact for this written information is the Field Supervisor (916/979-2710).

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the actions as outlined in the U.S. Coast Guard's December 26, 1996, request. The incidental take permitted in accordance with this project is authorized through the breeding season of 2000. Any maintenance activities anticipated after will require reinitiation of consultation on this project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have questions regarding this response, please contact Ms. Ina Pisani at (916)979-2725.

Sincerely,

Wayne S. White
Field Supervisor

cc: AES-Portland, OR (Div. of Consultation & Conservation Planning)
Caltrans, Oakland, CA ATTN: Chuck Morton

Literature Cited

Anderson, D. W., and J. O. Keith. 1980. The human influence on seabird nesting success: conservation implications. Bill. Conserve. 18:65-80.

Bond, R.M.S. 1946. The peregrine population of western North America. Condor 48:101-116.

Burger, J. 1981. The effect of human activity on birds at a coastal bay. Bill. Conserve. 21:231-241.

California Department of Transportation. 1996. Final Natural Environment Study/Biological Assessment for the Richmond-San Rafael Bridge Seismic Retrofit.

_____. 1996b. Biological assessment for San Francisco/Oakland Bay Bridge Seismic Retrofit.

Fyfe, R.W. and R.R. Olendorff. 1976. Minimizing the dangers of nesting studies to raptors and other sensitive species. Canadian Wildl. Serv. Occas. Paper No. 23. Ottawa. 16 pp.

Henson, P., and T. A. Grant. 1991. The effects of human disturbance on trumpeter swan breeding behavior. Wildl. Soc. Bull. 19:248-257.

Hickey, J.J. 1942. Eastern population of the duck hawk. Auk 59:176-204.

Hickey, J.J. and D.W. Anderson, ed. 1969. The peregrine falcon life history and population literature. University of Wisconsin Press.

Knight, R. L., and S. K. Knight Skagen. 1988. Effects of recreational disturbance on birds of prey: a review. Pages 355-359 in R. L. Glinski et al., eds. Proceedings of the Southwest Raptor Management Symposium and Workshop. Natl. Wildl. Fed., Washington, D.C.

Nelson, R.W. 1970. Some aspects of the breeding behavior of Peregrine Falcons on Langara Island, B.C. Univ. Calgary. (Unpub. Masters Thesis). 305 pp.

Pierce, D. J. and T. R. Simons. 1986. The Influence of Human Disturbance on Tufted Puffin Breeding Success. Auk 103:214-216.

USDI. Fish and Wildlife Service. 1982. Pacific Coast Recovery Plan for the American Peregrine Falcon. Portland, OR: U.S. Department of Interior, Fish and Wildlife Service. 87 pp.

USDI. 1970. Final Rule for the determination of endangered status for the American Peregrine Falcon. 35 Federal Register 16047, October 13, 1970.

USDI. 1995. Advance Notice of a Proposal to Remove the American Peregrine Falcon From the List of Endangered and Threatened Wildlife. 50 Federal Register 34406, June 30, 1995.

OFFICE OF THE MAYOR
SAN FRANCISCO

WILLIE LEWIS BROWN, JR.

July 21, 1997

The Honorable Mary V. King
Chair, MTC Bay Bridge Design Task Force
101 Eighth Street
Oakland, CA 94607-4700

Dear Supervisor King:

Thank you for allowing me this opportunity to provide additional information to the Task Force as its completes its deliberative process to develop the region's recommendation to the State Legislature on the future of the Bay Bridge.

The proposed replacement of the Transbay Terminal at the west end for the Bay Bridge is, in my judgment, a critical and integral element of the future of the Bay Bridge since it will insure that future AC Transit transbay service can be sustained and expanded, thus diminishing the level of automobile trips on the Bridge. San Francisco is at this time advancing the new terminal project to the engineering and design phase, based on a preliminary concept for the new terminal which has been accepted by all parties involved in the planning.

The current cost estimate for the new regional transit terminal is $125 million, a figure which is exclusive of the ramp work which will link the terminal to the Bridge. In order to meet this financial requirement, San Francisco and its funding partners will examine a wide range of funding sources, but it is very apparent that the most important potential source is the Bridge toll increase revenues. I believe that we need a minimum of $80 million from this source in order to assure a viable financing package for the new terminal.

Beyond this principal funding source, we will examine a variety of federal, state and local resources to meet the total funding needed. Sources we are currently examining include Caltrans seismic funds (for demolition), NEXTEA and STIP financing, as well as San Francisco Redevelopment tax increment funds. We will be working with Caltrans and the MTC in developing this financing package, but it is apparent that a modern new regional terminal must secure substantial Bridge toll revenues if it is to be realized without significant disruptions to the capital financing plans of regional transit operators.

I also believe that the concept of building a new span and retrofitting the Bridge will be totally lost if we do not improve the safety situation leading to and from Treasure and Yerba Buena Islands. These ramps have to be considered an operational safety hazard and we would be remiss in our duties as elected, or appointed, officials if we allowed the

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Bridge to be improved, but did nothing to improve the access. If you do not want to use the toll increase to pay for the improved ramp system, it is incumbent upon the MTC to develop an acceptable solution prior to submitting the region's preference to Sacramento.

As for the alignment and design of the Bridge, I feel that we have an incredible opportunity to make a defining statement with the eastern span. The arguments of a southern alignment versus a northern alignment have to be weighed with the impact each alignment has on either Yerba Buena Island or the Port of Oakland. It is my feeling that the economic development opportunities to the Port of Oakland outweigh the economic opportunities to San Francisco at Yerba Buena Island. Even though it will cost more money to build a signature Bridge, I am willing to support the efforts of the majority of this task force to support the northern alignment.

I hope that you take this all under careful consideration as you advance your recommendation to MTC and to Sacramento.

Thank you for allowing me another opportunity to comment.

Sincerely,

Willie L. Brown, Jr.
Mayor

WLBk2

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY PETE WILSON, Governor

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

August 18, 1997

Ala/SF 80
01200K

Mr. James Bybee
National Marine Fisheries Service
777 Sonoma Avenue, Room 325
San Ramon, CA 95405

Dear Mr. Bybee:

Special Status Species List for Construction of a New Eastern Span - San Francisco-Oakland Bay Bridge

The California Department of Transportation (Caltrans) is requesting a list of endangered, threatened, and candidate species that may be present in the vicinity of the San Francisco-Oakland Bay Bridge (SFOBB) East Span Seismic Retrofit Project, pursuant to Section 7 of the Endangered Species Act, as amended. Caltrans has previously evaluated the seismic retrofit of the existing structure. Due to the cost associated with that project, the alternative of replacing the existing structure with a new span is also being considered. Alternatives that will be evaluated potentially include different parallel alignments to the north and south, and various structural designs. The new span would be constructed from east of the Toll Plaza in Alameda County to Yerba Buena Island in San Francisco County. The project is located entirely within the USGS Oakland East 7.5 minute quadrangle. Construction will require work within the Bay waters as well as at the bridge abutments and approaches.

If you have any questions regarding this request, please call Mara Melandry at (510) 286-5582. Thank you.

Sincerely,

HARRY Y. YAHATA
District Director

By
Mara Melandry
ROBERT GROSS

for Office Chief
Office of Environmental Planning South

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY PETE WILSON, Governor

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

August 18, 1997

Ala/SF 80
01200K

Mr. Joel Medlin
Field Supervisor
U.S. Fish and Wildlife Service
Sacramento Field Office
3310 El Camino Avenue, Suite 130
Sacramento, CA 95821-6340

Dear Mr. Medlin:

Special Status Species List for Construction of a New Eastern Span - San Francisco-Oakland Bay Bridge

The California Department of Transportation (Caltrans) is requesting a list of endangered, threatened, and candidate species that may be present in the vicinity of the San Francisco-Oakland Bay Bridge (SFOBB) East Span Seismic Retrofit Project, pursuant to Section 7 of the Endangered Species Act, as amended. Caltrans has previously evaluated the seismic retrofit of the existing structure. Due to the cost associated with that project, the alternative of replacing the existing structure with a new span is also being considered. Alternatives that will be evaluated potentially include different parallel alignments to the north and south, and various structural designs. The new span would be constructed from east of the Toll Plaza in Alameda County to Yerba Buena Island in San Francisco County. The project is located entirely within the USGS Oakland East 7.5 minute quadrangle. Construction will require work within the Bay waters as well as at the bridge abutments and approaches.

If you have any questions regarding this request, please call Mara Melandry at (510) 286-5582. Thank you.

Sincerely,

HARRY Y. YAHATA
District Director

By

ROBERT GROSS
Mara Melandry
for Office Chief
Office of Environmental Planning South

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
777 Sonoma Ave. Rm 325
Santa Rosa, CA 95404

August 26, 1997 F/SW03:DWC

Mr. Harry Yahata
Cal Dept of Transportation
Box 23660
Oakland CA 94623-0660

Dear Mr Yahata:

Thank you for your letter of August 18, 1997 regarding the presence of federally listed (or proposed for listing) threatened or endangered species or critical habitat that may be affected by construction of a new eastern span of the San Francisco - Oakland Bay Bridge .

Available information indicates that the following species may occur in the project area:

Sacramento River winter-run chinook salmon (Oncorhynchus tshawytscha)- endangered
steelhead (Oncorhynchus mykiss) - Central California Coast ESU - threatened
steelhead (Oncorhynchus mykiss) - Central Valley ESU - proposed as endangered

The site is also located within the designated critical habitat for winter-run chinook salmon (58 FR 33212).

In addition, chinook salmon may occur in the project area and NMFS is currently conducting a status review pursuant to the Endangered Species Act for this species throughout its range in California, Oregon, Idaho, and Washington.

The U.S. Fish and Wildlife Service (USFWS) may also have listed species or critical habitat under its jurisdiction in the project area. Please contact Mr. Joel Medlin, Field Supervisor, USFWS, at 3310 El Camino Avenue, Room 130, Sacramento, California 95821, or (916) 979-2710, regarding the presence of listed species or critical habitat under USFWS jurisdiction that may be affected by your project.

If you have questions concerning these comments, please contact Dan Cheng of my staff at (707) 575-6069.

Sincerely,

James R. Byrne
Northern Area
Environmental Coordinator

cc: J. Slawson, NMFS Long Beach

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office
3310 El Camino Avenue, Suite 130
Sacramento, California 95821-6340

RECEIVED
SEP 1 1997
Office of Environmental Planning, South

IN REPLY REFER TO:
1-1-97-SP-2027

August 29, 1997

Robert Gross, Office Chief
Office of Environmental Planning South
(Attn: Mara Melandry)
Department of Transportation
Box 23660
Oakland, California 94623-0660

Subject: Species Lists for San Francisco-Oakland Bay Bridge East Span Seismic Retrofit Project, San Francisco County, CA

Dear Mr. Gross:

As requested by letter from your agency dated August 18, 1997, you will find enclosed lists of sensitive species that may be present in *or may be affected by* projects in the subject project area (see Enclosure A). These lists fulfill the requirement of the Fish and Wildlife Service (Service) to provide species lists pursuant to section 7(c) of the Endangered Species Act of 1973, as amended (Act).

The animal species on the Enclosure A quad list are those species we believe may occur within, *or be affected by projects within*, the USGS Oakland East Quad, where your project is planned.

Any plants on the Enclosure A quad list are those *that have actually been observed* in the project quad. Plants on the county list may also occur in the quad where your project is planned.

Some of the species listed in Enclosure A may not be affected by the proposed action. A trained biologist or botanist, familiar with the habitat requirements of the listed species, should determine whether these species or habitats suitable for these species may be affected by the proposed action. For plant surveys, the Service recommends using the enclosed Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Species (Enclosure C).

Some pertinent information concerning the distribution, life history, habitat requirements, and published references for the listed species is available upon request. This information may be helpful in preparing the biological assessment for this project, if one is required. Please see Enclosure B for a discussion of the responsibilities Federal agencies have under section 7(c) of the Act and the conditions under which a biological assessment must be prepared by the lead Federal agency or its designated non-Federal representative.

Formal consultation, pursuant to 50 CFR § 402.14, should be initiated if you determine that a listed species may be affected by the proposed project. If you determine that a proposed species may be adversely affected, you should consider requesting a conference with our office pursuant to 50 CFR § 402.10. Informal consultation may be utilized prior to a written request for formal consultation to exchange information and resolve conflicts with respect to a listed species. If a biological assessment is required, and it is not initiated within 90 days of your receipt of this letter, you should informally verify the accuracy of this list with our office.

Candidate species are currently being reviewed by the Service and are under consideration for possible listing as endangered or threatened. Candidate species have no protection under the Endangered Species Act, but are included for your consideration as it is possible that one or more of these candidates could be proposed and listed before the subject project is completed. Should the biological assessment reveal that candidate species may be adversely affected, you may wish to contact our office for technical assistance. One of the potential benefits from such technical assistance is that by exploring alternatives early in the planning process, it may be possible to avoid conflicts that could otherwise develop, should a candidate species become listed before the project is completed.

In the Federal Register of February 28, 1996, the Service changed its policy on candidate species. The term *candidate* now strictly refers to species for which the Service has on file enough information to propose listing as endangered or threatened. Former *category 2 candidate* species - species for which listing is possibly appropriate but for which the Service lacks sufficient information to support a listing proposal - are now called *species of concern.* They are no longer monitored by the Service. However we have retained them on the enclosed list for general information. We encourage consideration of them in project planning, as they may become candidate species in the future.

If the proposed project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by the U.S. Army Corps of Engineers (Corps), a Corps permit will be required, pursuant to section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act. Impacts to wetland habitats require site specific mitigation and monitoring. You may request a copy of the Service's General Mitigation and Monitoring Guidelines or submit a detailed description of the proposed impacts for specific comments and recommendations. If you have any questions regarding wetlands, contact Mark Littlefield at (916) 979-2113.

Please contact Mr. Michael Thabault at (916) 979-2752 if you have any questions regarding the attached list or your responsibilities under the Endangered Species Act. For the fastest response to species list requests, address them to the attention of the section 7 office assistant at this address.

Sincerely,

Patrick Leonard

for Wayne S. White
Field Supervisor

Enclosures

ENCLOSURE A

Endangered and Threatened Species that May Occur in or be Affected by Projects in the Area of the Following California County or Counties

August 29, 1997

SAN FRANCISCO COUNTY

Listed Species

Mammals

- salt marsh harvest mouse, *Reithrodontomys raviventris* (E)
- Steller (=northern) sea-lion, *Eumetopias jubatus* (T)

Birds

- American peregrine falcon, *Falco peregrinus anatum* (E)
- California brown pelican, *Pelecanus occidentalis californicus* (E)
- California clapper rail, *Rallus longirostris obsoletus* (E)
- western snowy plover, *Charadrius alexandrinus nivosus* (T)
- bald eagle, *Haliaeetus leucocephalus* (T)

Reptiles

- leatherback turtle, *Dermochelys coriacea* (E)
- loggerhead turtle, *Caretta caretta* (T)
- green turtle, *Chelonia mydas (incl. agassizi)* (T)
- olive (=Pacific) ridley sea turtle, *Lepidochelys olivacea* (T)

Amphibians

- California red-legged frog, *Rana aurora draytonii* (T)

Fish

- tidewater goby, *Eucyclogobius newberryi* (E)
- winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)
- winter-run chinook salmon critical habitat, *Oncorhynchus tshawytscha* (E)
- delta smelt, *Hypomesus transpacificus* (T)
- Central California steelhead, *Oncorhynchus mykiss* (T)

Invertebrates

- mission blue butterfly, *Icaricia icarioides missionensis* (E)
- San Bruno elfin butterfly, *Incisalia mossii bayensis* (E)

Plants

- Presidio manzanita, *Arctostaphylos hookeri ssp. ravenii* (E)

SAN FRANCISCO COUNTY

Listed Species

Plants

- Presidio clarkia, *Clarkia franciscana* (E)
- Marin dwarf-flax, *Hesperolinon congestum* (T)
- marsh sandwort, *Arenaria paludicola* (E)
- beach layia, *Layia carnosa* (E)

Proposed Species

Fish

- Sacramento splittail, *Pogonichthys macrolepidotus* (PT)

Plants

- San Francisco lessingia, *Lessingia germanorum* (PE)

Candidate Species

Amphibians

- California tiger salamander, *Ambystoma californiense* (C)

Species of Concern

Mammals

- greater western mastiff-bat, *Eumops perotis californicus* (SC)
- long-eared myotis bat, *Myotis evotis* (SC)
- fringed myotis bat, *Myotis thysanodes* (SC)
- long-legged myotis bat, *Myotis volans* (SC)
- Yuma myotis bat, *Myotis yumanensis* (SC)
- San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)
- Pacific western big-eared bat, *Plecotus townsendii townsendii* (SC)
- salt marsh vagrant shrew, *Sorex vagrans halicoetes* (SC)

Birds

- tricolored blackbird, *Agelaius tricolor* (SC)
- Bell's sage sparrow, *Amphispiza belli belli* (SC)
- ferruginous hawk, *Buteo regalis* (SC)
- little willow flycatcher, *Empidonax traillii brewsteri* (SC)
- saltmarsh common yellowthroat, *Geothlypis trichas sinuosa* (SC)

SAN FRANCISCO COUNTY

Species of Concern

Birds

- black rail, *Laterallus jamaicensis* (SC)
- Alameda (South Bay) song sparrow, *Melospiza melodia pusillula* (SC)

Reptiles

- northwestern pond turtle, *Clemmys marmorata marmorata* (SC)
- southwestern pond turtle, *Clemmys marmorata pallida* (SC)
- California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

- foothill yellow-legged frog, *Rana boylii* (SC)

Fish

- green sturgeon, *Acipenser medirostris* (SC)
- river lamprey, *Lampetra ayresi* (SC)
- Pacific lamprey, *Lampetra tridentata* (SC)
- longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

- Opler's longhorn moth, *Adela oplerella* (SC)
- sandy beach tiger beetle, *Cicindela hirticollis gravida* (SC)
- globose dune beetle, *Coelus globosus* (SC)
- Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)
- bumblebee scarab beetle, *Lichnanthe ursina* (SC)

Plants

- San Francisco Bay spineflower, *Chorizanthe cuspidata var. cuspidata* (SC)
- San Francisco wallflower, *Erysimum franciscanum* (SC)
- fragrant fritillary, *Fritillaria liliacea* (SC)
- San Francisco gumplant, *Grindelia hirsutula var. maritima* (SC)
- Marin checkermallow, *Sidalcea hickmanii ssp. viridis* (SC)
- Mission Delores campion, *Silene verecunda ssp. verecunda* (SC)
- San Francisco owl's-clover, *Triphysaria floribunda* (SC)
- San Francisco manzanita, *Arctostaphylos hookeri ssp. franciscana* (SC)
- alkali milk-vetch, *Astragalus tener var. tener* (SC)
- compact cobweb thistle, *Cirsium occidentale var. compactum* (SC)
- Diablo rock-rose, *Helianthella castanea* (SC)

SAN FRANCISCO COUNTY

Species of Concern

Plants

Kellogg's (wedge-leaved) horkelia, *Horkelia cuneata ssp. sericea* (SC)

San Francisco popcornflower, *Plagiobothrys diffusus* (SC)

adobe sanicle, *Sanicula maritima* (SC)

coast lily, *Lilium maritimum* (SC)

KEY:

(E)	*Endangered*	Listed (in the Federal Register) as being in danger of extinction.
(T)	*Threatened*	Listed as likely to become endangered within the foreseeable future.
(P)	*Proposed*	Officially proposed (in the Federal Register) for listing as endangered or threatened.
(C)	*Candidate*	Candidate to become a *proposed* species.
(SC)	*Species of Concern*	May be endangered or threatened. Not enough biological information has been gathered to support listing at this time.
(*)	Possibly extinct.	
	Critical Habitat	Area essential to the conservation of a species.

ENCLOSURE A

Endangered and Threatened Species that May Occur in
or be Affected by Projects in the Following Selected Quads
August 29, 1997

QUAD : 465C OAKLAND EAST

Listed Species

Mammals

salt marsh harvest mouse, *Reithrodontomys raviventris* (E)

Birds

American peregrine falcon, *Falco peregrinus anatum* (E)

California brown pelican, *Pelecanus occidentalis californicus* (E)

California clapper rail, *Rallus longirostris obsoletus* (E)

bald eagle, *Haliaeetus leucocephalus* (T)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

tidewater goby, *Eucyclogobius newberryi* (E)

Central California steelhead, *Oncorhynchus mykiss* (T)

Invertebrates

vernal pool fairy shrimp, *Branchinecta lynchi* (T)

Plants

robust spineflower, *Chorizanthe robusta* (E)

Presidio clarkia, *Clarkia franciscana* (E)

Proposed Species

Reptiles

Alameda whipsnake, *Masticophis lateralis euryxanthus* (PE)

Fish

Sacramento splittail, *Pogonichthys macrolepidotus* (PT)

Invertebrates

callippe silverspot butterfly, *Speyeria callippe callippe* (PE)

Plants

pallid manzanita (Alameda manzanita), *Arctostaphylos pallida* (PE)

QUAD : 465C OAKLAND EAST

Candidate Species

Mammals

San Joaquin Valley woodrat, *Neotoma fuscipes riparia* (C)

Amphibians

California tiger salamander, *Ambystoma californiense* (C)

Species of Concern

Mammals

greater western mastiff-bat, *Eumops perotis californicus* (SC)

long-eared myotis bat, *Myotis evotis* (SC)

fringed myotis bat, *Myotis thysanodes* (SC)

long-legged myotis bat, *Myotis volans* (SC)

Yuma myotis bat, *Myotis yumanensis* (SC)

San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)

San Joaquin pocket mouse, *Perognathus inornatus* (SC)

Pacific western big-eared bat, *Plecotus townsendii townsendii* (SC)

Alameda Island mole, *Scapanus latimanus parvus* (SC)

Birds

tricolored blackbird, *Agelaius tricolor* (SC)

Bell's sage sparrow, *Amphispiza belli belli* (SC)

ferruginous hawk, *Buteo regalis* (SC)

little willow flycatcher, *Empidonax traillii brewsteri* (SC)

saltmarsh common yellowthroat, *Geothlypis trichas sinuosa* (SC)

black rail, *Laterallus jamaicensis* (SC)

Alameda (South Bay) song sparrow, *Melospiza melodia pusillula* (SC)

Reptiles

northwestern pond turtle, *Clemmys marmorata marmorata* (SC)

southwestern pond turtle, *Clemmys marmorata pallida* (SC)

California horned lizard, *Phrynosoma coronatum frontale* (SC)

QUAD : 465C OAKLAND EAST

Species of Concern

Amphibians

foothill yellow-legged frog, *Rana boylii* (SC)

western spadefoot toad, *Scaphiopus hammondii* (SC)

Invertebrates

Ricksecker's water scavenger beetle, *Hydrochara ricksecker*i (SC)

San Francisco lacewing, *Nothochrysa californica* (SC)

Plants

alkali milk-vetch, *Astragalus tener var. tener* (SC)

fragrant fritillary, *Fritillaria liliacea* (SC)

Diablo rock-rose, *Helianthella castanea* (SC)

Kellogg's (wedge-leaved) horkelia, *Horkelia cuneata ssp. sericea* (SC)

most beautiful (uncommon) jewelflower, *Streptanthus albidus ssp. peramoenus* (SC)

KEY:

(E)	*Endangered*	Listed (in the Federal Register) as being in danger of extinction.
(T)	*Threatened*	Listed as likely to become endangered within the foreseeable future.
(P)	*Proposed*	Officially proposed (in the Federal Register) for listing as endangered or threatened.
(C)	*Candidate*	Candidate to become a *proposed* species.
(SC)	*Species of Concern*	May be endangered or threatened. Not enough biological information has been gathered to support listing at this time.
(*)		Possibly extinct.
	Critical Habitat	Area essential to the conservation of a species.

Enclosure B

FEDERAL AGENCIES' RESPONSIBILITIES UNDER SECTIONS 7(a) and (c) OF THE ENDANGERED SPECIES ACT

SECTION 7(a) Consultation/Conference

Requires: (1) federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species; (2) Consultation with FWS when a federal action may affect a listed endangered or threatened species to insure that any action authorized, funded, or carried out by a federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The process is initiated by the federal agency after determining the action may affect a listed species; and (3) Conference with FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat.

SECTION 7(c) Biological Assessment-Major Construction Activity[1]

Requires federal agencies or their designees to prepare a Biological Assessment (BA) for major construction activities. The BA analyzes the effects of the action[2] on listed and proposed species. The process begins with a Federal agency requesting from FWS a list of proposed and listed threatened and endangered species. The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the list, the accuracy of the species list should be informally verified with our Service. No irreversible commitment of resources is to be made during the BA process which would foreclose reasonable and prudent alternatives to protect endangered species. Planning, design, and administrative actions may proceed; however, no construction may begin.

We recommend the following for inclusion in the BA: an on-site inspection of the area affected by the proposal which may include a detailed survey of the area to determine if the species or suitable habitat is present; a review of literature and scientific data to determine species' distribution, habitat needs, and other biological requirement; interviews with experts, including those within FWS, State conservation departments, universities and others who may have data not yet published in scientific literature; an analysis of the effects of the proposal on the species in terms of individuals and populations, including consideration of indirect effects of the proposal on the species and its habitat; an analysis of alternative actions considered. The BA should document the results, including a discussion of study methods used, and problems encountered, and other relevant information. The BA should conclude whether or not a listed or proposed species will be affected. Upon completion, the BA should be forwarded to our office.

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[1] A construction project (or other undertaking having similar physical impacts) which is a major federal action significantly affecting the quality of the human environment as referred to in NEPA (42 U.S.C. 4332(2)C).

[2] "Effects of the action" refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action.

Enclosure C

Guidelines For Conducting And Reporting Botanical Inventories
For Federally Listed, Proposed And Candidate Plants

(September 23, 1996)

These guidelines describe protocols for conducting botanical inventories for federally listed, proposed and candidate plants, and describe minimum standards for reporting results. The Service will use, in part, the information outlined below in determining whether the project under consideration may affect any listed, proposed or candidate plants, and in determining the direct, indirect, and cumulative effects.

Field inventories should be conducted in a manner that will locate listed, proposed, or candidate species (target species) that may be present. The entire project area requires a botanical inventory, except developed agricultural lands. The field investigator(s) should:

1. Conduct inventories at the appropriate times of year when target species are present and identifiable. Inventories will include all potential habitats. Multiple site visits during a field season may be necessary to make observations during the appropriate phenological stage of all target species.

2. If available, use a regional or local reference population to obtain a visual image of the target species and associated habitat(s). If access to reference populations(s) is not available, investigators should study specimens from local herbaria.

3. List every species observed and compile a comprehensive list of vascular plants for the entire project site. Vascular plants need to be identified to a taxonomic level which allows rarity to be determined.

4. Report results of botanical field inventories that include:

   a. a description of the biological setting, including plant community, topography, soils, potential habitat of target species, and an evaluation of environmental conditions, such as timing or quantity of rainfall, which may influence the performance and expression of target species

   b. a map of project location showing scale, orientation, project boundaries, parcel size, and map quadrangle name

   c. survey dates and survey methodology(ies)

   d. if a reference population is available, provide a written narrative describing the target species reference population(s) used, and date(s) when observations were made

   e. a comprehensive list of all vascular plants occurring on the project site for each habitat type

   f. current and historic land uses of the habitat(s) and degree of site alteration

   g. presence of target species off-site on adjacent parcels, if known

   h. an assessment of the biological significance or ecological quality of the project site in a local and regional context

5. If target species is(are) found, report results that additionally include:

a. a map showing federally listed, proposed and candidate species distribution as they relate to the proposed project

b. if target species is (are) associated with wetlands, a description of the direction and integrity of flow of surface hydrology. If target species is (are) affected by adjacent off-site hydrological influences, describe these factors.

c. the target species phenology and microhabitat, an estimate of the number of individuals of each target species per unit area; identify areas of high, medium and low density of target species over the project site, and provide acres of occupied habitat of target species. Investigators could provide color slides, photos or color copies of photos of target species or representative habitats to support information or descriptions contained in reports.

d. the degree of impact(s), if any, of the proposed project as it relates to the potential unoccupied habitat of target habitat.

6. Document findings of target species by completing California Native Species Field Survey Form(s) and submit form(s) to the Natural Diversity Data Base. Documentation of determinations and/or voucher specimens may be useful in cases of taxonomic ambiguities, habitat or range extensions.

7. Report as an addendum to the original survey, any change in abundance and distribution of target plants in subsequent years. Project sites with inventories older than 3 years from the current date of project proposal submission will likely need additional survey. Investigators need to assess whether an additional survey(s) is (are) needed.

8. Adverse conditions may prevent investigator(s) from determining presence or identifying some target species in potential habitat(s) of target species. Disease, drought, predation, or herbivory may preclude the presence or identification of target species in any year. An additional botanical inventory(ies) in a subsequent year(s) may be required if adverse conditions occur in a potential habitat(s). Investigator(s) may need to discuss such conditions.

9. Guidance from California Department of Fish and Game (CDFG) regarding plant and plant community surveys can be found in Guidelines for Assessing the Effects of Proposed Developments on Rare and Endangered Plants and Plant Communities, 1984. Please contact the CDFG Regional Office for questions regarding the CDFG guidelines and for assistance in determining any applicable State regulatory requirements.

c:JVLS,HYY,KJT,SH,BHM,MM,SHEMINGER

From: Denis Mulligan

OFFICE OF THE MAYOR
SAN FRANCISCO

WILLIE LEWIS BROWN, JR.

TREASURE ISLAND PROJECT
410 PALM AVENUE
BUILDING 1, ROOM 237
TREASURE ISLAND
SAN FRANCISCO, CA 94130
(415) 274-0660
FAX (415) 274-0299

LARRY FLORIN, DIRECTOR
WENDY LINKA, DIRECTOR OF MARKETING
CHRISTINE TEJADA, DIRECTOR OF DEVELOPMENT

September 5, 1997

Honorable Pete Wilson
Governor, State of California
State Capital
Sacramento, CA 95814

Dear Governor Wilson:

I am writing to urge your signature on AB-699, the bill that would create the Treasure Island Development Authority. The creation of this Authority will allow us to consolidate a duplicate and redundant decision-making process into one entity. Eliminating this redundancy will allow us to expedite the reuse of Treasure Island, a project that will benefit all Californians. I have spoken with Jim Van Loben Sels regarding his concerns about access to the existing and proposed new eastern span of the San Francisco-Oakland Bay Bridge. I am enclosing a letter that I have sent to Mr. Van Loben Sels that addresses his concerns.

Thank you in advance.

Sincerely,

Willie L. Brown Jr.
Mayor

enclosure

RECYCLED PAPER

OFFICE OF THE MAYOR
SAN FRANCISCO

WILLIE LEWIS BROWN, JR.

TREASURE ISLAND PROJECT
410 PALM AVENUE
BUILDING 1, ROOM 237
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LARRY FLORIN, DIRECTOR
WENDY LINKA, DIRECTOR OF MARKETING
CHRISTINE TEJADA, DIRECTOR OF DEVELOPMENT

September 5, 1997

James W. van Loben Sels
Director
California Department of Transportation
1120 "N" Street
Sacramento, CA 95814

Dear Jim:

Based on our recent conversation, I understand that Caltrans is concerned about access to the eastern span of the Bay Bridge. As you know, the City, acting as the Local Reuse Authority for Treasure Island, is beginning its negotiations with the Navy over the conveyance of Treasure and Yerba Buena Islands to the City from the Navy. If we should be successful in these negotiations, we are prepared to make the following offer to Caltrans to help facilitate uninterrupted access:

1. The City shall grant, without cost, an easement for the use, operation, maintenance, repair, construction, reconstruction, and retrofit of the existing San Francisco-Oakland Bay Bridge and associated transportation facilities under, over, and across Yerba Buena Island. This easement shall extend 39 meters northwesterly and 39 meters southwesterly from each edge of the existing San Francisco-Oakland Bay Bridge and Tunnel structures. Furthermore, we will agree that no non-transportation uses will be allowed within that easement area without written approval of Caltrans, on the condition that Caltrans will not unreasonably withhold its approval for such projects.

2. The City shall execute a similar agreement for the proposed San Francisco-Oakland Bay Bridge and Tunnel new eastern span at the appropriate time.

3. The City will also grant Caltrans appropriate easements for ingress and egress across existing and future roads on Yerba Buena Island.

Larry Florin of my staff is prepared to work out the details of this agreement.

I look forward to continuing to work together on this important project.

Sincerely,

Willie L. Brown Jr.
Mayor

cc: Governor Pete Wilson

RECYCLED PAPER

OFFICE OF THE MAYOR
SAN FRANCISCO

WILLIE LEWIS BROWN, JR.

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LARRY FLORIN, DIRECTOR
WENDY LINKA, DIRECTOR OF MARKETING
CHRISTINE TEJADA, DIRECTOR OF DEVELOPMENT

RECEIVED
DEC 1 1997
B. QUAN

Harry Yahata
Regional Director
California Department of Transportation
Box 23660
Oakland, Ca. 94623-0660

Dear Harry,

I am writing to express my concern regarding the environmental impact report being prepared for the East span of the Bay Bridge replacement project. I understand that the EIR does not currently include a discussion of a proposed improvement for the TI/YBI ramps. I urge you to amend the project scope to include this alternative in your project.

As you know the existing ramp system is substandard having been designed for traffic and speeds of the 1930's. It is important to have the ramps brought up to current standards in order to make reuse of Treasure Island feasible. As you know we are actively pursuing funding alternatives that will allow this to be included in the reconstruction project.

We understand that the reason that you are not including the ramp reconstruction in the EIR is that the ramp project is not currently funded. It is my understanding that you are including an alternative that would include a bicycle lane on the new East span a project that is not currently funded. I would urge you to apply the same standard to the proposed access ramp improvement project. As you are aware including the proposal in the EIR at this stage will certainly help to expedite the overall project once we are successful in securing funding.

My staff would be happy to work with you to provide whatever information your staff may need to have included in the EIR.

Thank you for your consideration of this request.

Sincerely,

Willie L. Brown Jr.
Mayor

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY PETE WILSON, Governor

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

December 17, 1997

The Honorable Willie Brown, Jr.
Treasure Island Project
410 Palm Avenue
Building 1, Room 237
Treasure Island
San Francisco, CA 94130

Dear Mayor Brown:

Thank you for your letter regarding the ramps of Yerba Buena Island. We received your letter on November 26, 1997.

We agree that ramps on the Island are important element to the success of the Treasure Island Reuse plan and that the ramps are substandard. As you are aware, the replacement of the ramps is not currently funded. Caltrans looks forward to working with you and the Metropolitan Transportation Commission (MTC) to secure funding for the ramps. When funding is secured, a separate environmental document can be prepared. If the funding issue is resolved shortly, the new ramps and the seismic safety project on the East Span could be constructed at the same time. Caltrans agrees that it is desirable to construct both projects at the same time.

Replacement of the ramps is not related to the purpose and need of the East Span Seismic Safety Project. Furthermore, the ramps are outside our jurisdiction since they are owned by the Navy. To include replacement of the ramps in the East Span Seismic Safety Project environmental document would be to expand the scope beyond the intent of seismic safety. Caltrans, accordingly, cannot amend the project scope to include ramp reconstruction in the East Span Seismic Safety Project. At the same time, it appears that with any of the replacement alternatives for the East Span project, the eastbound on-ramp must be demolished and replaced; this on-ramp conflicts with all the replacement alternatives. Accordingly, this will be addressed as part of the East Span Seismic Safety Project.

We would like to clarify the status of the pedestrian/bicycle path on the east span. It is not an alternative to be evaluated in the Environmental Impact Statement (EIS); it is rather a design variation for each replacement alternative. Further, while such a facility is not yet funded, legislation has been passed which will allow MTC to decide whether to continue the $1.00 toll surcharge for an additional two years to fund amenities such as a path. A funding mechanism is therefore in place for the pedestrian/bicycle path, should MTC decide to fund it. Should MTC decide not to fund the pedestrian/bicycle path, the seismic safety project can continue to move forward with the design variations that do not include it. This is very important because federal law prohibits approval of a project that is not fully funded.

Caltrans looks forward to working with San Francisco and the Metropolitan Transportation Commission in securing the necessary funding for this important transportation improvement. Please contact me at (510) 286-5900 to discuss this matter further.

Sincerely,

for HARRY Y. YAHATA
District Director

c: Larry Dahms (Metropolitan Transportation Commission)
Kenn Parsons (Department of the Navy)
Hilary Gitelman (City and County of San Francisco, Planning Department)

File Ref.
Ala/SF 80.
012000

CITY OF OAKLAND

CITY HALL • ONE CITY HALL PLAZA • OAKLAND, CALIFORNIA 94612

Landmarks Preservation
Advisory Board

TTY 839-6451

January 14, 1998

Mr. Harry Y. Yahata, District Director
State of California Department of Transportation
P.O. Box 23660
Oakland, CA 94623-0660

Dear Mr. Yahata:

This is in response to your request for comments under the Federal Section 106 process on the proposed seismic improvement project at the San Francisco-Oakland Bay Bridge, a civil engineering landmark that is eligible for listing on the National Register of Historic Places.

In July, 1997 CalTrans environmental planner Mara Malandry made a presentation to the Oakland Landmarks Preservation Advisory Board and showed the CD-ROM that introduces the option of an entirely new East Bay Span between Oakland and Yerba Buena Island. The Board discussed preservation issues associated with removal of the historic East Bay Span, and heard speakers. The Board's discussion continued at the September 13, 1997 Landmarks Board meeting. Our concerns and recommendations are outlined below. It is our understanding that participation in this manner will not limit or preclude further comment in the design or environmental review process. We expect that at such time as the significance of the Bay Bridge East Bay span is fully documented, additional mitigation measures will merit discussion and consideration.

1. **Examine retrofit of the existing, historic East Bay span as an option.**

   Retrofit is generally the most preservation-sensitive approach for the continued use of older structures determined to fall short of modern standards. Has the case been made that retrofit of the East Bay span is not a feasible alternative? From news reports it appears to be the least expensive option in terms of construction costs. (Do the costs represented for a new East Bay span include modification of access during construction, traffic delays and disruption, energy costs, impacts on landfill from demolition debris, etc.?) Retrofit should be examined as an alternative to replacement, including the impact, if any, of the retrofit design on the appearance of the East Bay span.

2. Examine a combination of demolition and retrofit to retain the most significant part of the East Bay span.

Another preservation-sensitive alternative would be to keep and retrofit the original cantilevered section of the East Bay span--which is where the engineering significance resides--but build a new improved viaduct leading up to it.

3. Mitigation to demolition

If demolition and replacement are chosen, the history and significance of the East Bay span of the Bay Bridge suggest certain areas for mitigation:

a. Engineering accomplishments: largest cantilever in United States; deepest pier support in the world.
- Consult engineering professionals to see whether any useful information might be derived from stress tests (or the like) prior to demolition, from analysis of how well the bridge and its parts have held up over sixty years of use, and from professional observation of the demolition process. Undertake the engineers' recommendations, and record the results in a manner accessible to professionals and the interested public.
- Prepare a professional monograph on the engineering methods applied in the design and construction of the Bay Bridge, with an emphasis on unique achievements or approaches.
- Construct a model of the Bay Bridge to illustrate engineering considerations (depth of San Francisco Bay, etc.) and design solutions. (See #3f below.) The lightness of the structure, and the grace of the pylons as seen from the water, are among the characteristics that should be conveyed.
- Document the experience of driving across the cantilever section in various types of motor vehicles, and of travelling underneath it in various types of boat.

b. Hoover-Young Commission policy "Not only will it be the largest bridge in the world...but it also must be the most beautiful..."
-This founding philosophy should pertain equally to the replacement structure. The sheer size of the bridge will make it a visual marker for the region; it should be pleasing in appearance, a memorable experience for visitors, and an asset to daily life for residents.
-The character of the Bay Bridge is important in the

context of San Francisco Bay as a whole. Each of the four bridges on the bay has its own distinct character. Of the three proposals for replacement of the East Span, one strongly resembles the San Mateo Bridge. To pursue that design would deny Oakland the positive identity a bridge can confer, and would deprive the Bay Area of its distinguished collection of four differentiated bridge structures. A rule-of-thumb the Landmarks Board often uses is that to justify demolition, the proposed replacement should be at least as good as the historic structure.

-The replacement design should include a gateway feature on the Oakland side to signal and celebrate arrival in Oakland. The existing two-level bridge has long deprived Oakland of the drama of an upper-level entrance; a new bridge at last affords Oakland equal consideration, but the proposals thus far position the "landmark" feature next to Yerba Buena Island instead of the East Bay. In the west bound direction, the gateway would celebrate at the Oakland terminus the threshold at which one leaves land and begins to cross San Francisco Bay. Landscape elements could also be part of a gateway feature.

-(Although the history says the Hoover Commission policy was developed to protect the views of San Francisco, arguably the change in the relative importance of San Francisco and Alameda/Contra Costa counties would dictate that the East Span should now also be of very high design quality.)

-To preserve the quality of personal connection and association between Bay Area residents and this important landmark, commission from a well-regarded artist a large scale painting (in the tradition of California landscape painting) that portrays the East Span of the Bay Bridge in the context of the Oakland shoreline in the year 2000, for display at a prominent, publicly accessible location.

c. Design criteria. The design requirements which drove the original Bay Bridge design should be acknowledged in the new design; a deep channel was needed on the Oakland side, hence the cantilever solution. Isn't the shipping channel still necessary? The viaduct proposal does not appear to express the importance of shipping to Oakland, or to take ship traffic into consideration. The new East Span design should have some visual relation to the historic cantilever and to contemporary Oakland as a major Pacific port. The bridge design must accommodate and facilitate ship traffic to and from the Port of Oakland.

d. Human aspect of the bridge construction. Compile the story of the construction of the Bay Bridge. The history suggests that in addition to the stories of the steel workers, those of the engineers who helped to build the bridge are worth documenting.

e. Role of the bridge in regional development and importance of the eastern channel to the regional economy. This is a large enough topic to support a documentary video, oral history, etc. covering population shifts, land use changes, transportation history, the two ports, international commerce, and other socio-economic aspects.

f. Create a permanent interpretive center. Combine the above historical aspects (as well as material developed for Bay Bridge 50th Anniversary) into interpretive programs for the public, school curriculum, etc. Create a permanent study center to house histories, videos, artifacts, a scale model of the Bay Bridge (like the Bay Model), Peter Stackpole photographs, paintings and drawings, computer simulations, etc. Include an exhibit which compares the design of the original Bay Bridge and the replacement, and, equally important, compares the design process then and now.

A building in downtown Oakland, constructed in the same period as the Bay Bridge, could be devoted to such an interpretive center about the Bay Bridge and associated transportation themes. This would preserve and expand understanding and appreciation of the Bay Bridge, would create a visitors' destination in Oakland, and return a historic building to permanent active use.

- In association with Bay Area newspapers, issue a Souvenir Edition upon the re-opening of the East Bay Span, in the manner of the November 12, 1936 San Francisco Examiner "Bridge Souvenir Edition." Include a replica of the 1936 souvenir edition, along with historic narrative and illustrations.

4. Historic rail component.

To preserve the historic rail aspect, include light rail on the bridge or design it to support conversion to light rail in the future.

5. Reuse of materials

- Salvage instructive artifacts for display at the interpretive center, or other educational facilities.

-Reuse components of the East Span for other purposes. Maintain a roster of locations where parts of the bridge have been recycled for other uses, or in other forms.
- Consider using components of the original bridge to create a large public art project located at the Oakland terminus, such as the gateway feature to Oakland and the East Bay discussed above.

In conclusion, the HABS/HAER documentation, and the more complete history prepared during environmental review, may well suggest additional mitigation measures to perpetuate the cultural, architectural and technical significance of the Bay Bridge.

Thank you very much for the opportunity to comment on this extremely important project. We look forward to reviewing the documentation which elaborates on the full significance of the East Bay span.

Please continue to keep us informed by way of the Secretary to the Landmarks Preservation Advisory Board, Helaine Kaplan Prentice, at Community & Economic Development Agency, 1330 Broadway, 2nd Floor, Oakland, CA 94612, phone (510) 238-2978.

Sincerely yours,

Andrew Carpentier HKP

ANDREW CARPENTIER, Chair

cc: Robert Gross, District Office Chief
✓Mara Malandry, Office of Environmental Planning, South
Landmarks Preservation Advisory Board members: Annalee Allen, Janet Benson, Andrew Carpentier, Carolyn Douthat, Rene Dymond, Norman Hooks, George I. Lythcott
Marina Carlson, Office of Mayor Elihu Harris
Chris Pattillo, Pattillo & Garrett Landscape Architects
Jeff Eichenfeld, California Preservation Foundation
Oakland Heritage Alliance
Andrew Altmam, CEDA, Chief of Planning
Charles Bryant, CEDA, Zoning Division
Willie Yee, CEDA, Zoning Division
Terry Roberts, Director, PWA

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STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY PETE WILSON, Governor

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

February 11, 1998

Andrew Carpentier, Chair
Landmarks Preservation Advisory Board
One City Hall Plaza
Oakland, California 94612

Dear Mr. Carpentier:

Thank you for your letter of January 14 concerning the proposed seismic improvement of the East Bay spans of the San Francisco – Oakland Bay Bridge. Your suggestions for measures to mitigate adverse effects of the possible demolition of the existing East Bay spans were helpful, and we appreciate your time and thoughtfulness in developing them. If a replacement alternative is chosen for this project, we will carefully consider all of your suggested mitigation measures and will discuss them with you and the State Historic Preservation Officer (SHPO) as part of our compliance with the National Historic Preservation Act.

In addition, we have the following responses to your comments on the design of a new bridge:

- **Consider retrofit of the existing East Bay span as an option**

Although the Governor and the Metropolitan Transportation Commission's Bay Bridge Task Force have recommended that the bridge be replaced, retrofit of the existing structure will be studied as an alternative through the Environmental Impact Statement (EIS) process. When the cost of a retrofit is 50% or more of the cost of new construction, it is Caltrans' policy to consider reconstruction. You may be interested in the following quote from a summary statement of an economic analysis comparing the costs of a retrofit versus a new bridge:

> "The construction costs of a new bridge will be about $25 million more than that of the retrofit option. However, considering the life-cycle cost of the bridge including maintenance costs, deck rehabilitation costs, probable earthquake damage repairs, and the salvage value of the existing bridge, the new bridge will cost some $281 million less than retrofitting the existing bridge. When user costs are also incorporated into the total cost of the new bridge (including the cost of safety risks associated with the existing bridge while the new bridge is being built), as noted above, the new bridge alternative would cost $625 million less than the retrofit option."

In addition to the economic advantages of a new bridge, there are seismic advantages as well. A retrofitted existing bridge would not perform as well as a new bridge in the event of a severe earthquake.

- **Consider a combination of demolition and retrofit to retain the cantilever portion of the East Bay span.**

The cantilever section of the East Bay span could be retrofitted at a comparable initial construction cost to constructing either the cable-stayed or suspension designs. However, the retrofit would provide a low level of serviceability in the event of a major earthquake. It would not collapse, but would likely sustain major damage, require closure to traffic and would then need to be replaced. This would have a profound impact on the Bay Area economy. A new bridge would remain fully serviceable after a maximum credible earthquake. The life span of a retrofitted cantilever section would be 50 years, compared to a 100 to 150 year life span for a new bridge. In addition, constructing a new viaduct from the Oakland shore to the existing cantilever section and on Yerba Buena Island would require that the bridge be shut down for a minimum of six months.

- **Aesthetics of a replacement bridge**

The Bay Bridge Engineering and Design Advisory Panel (EDAP), which advised the MTC Bay Bridge Task Force, recommended that a new bridge be visually memorable and convey a sense of gateway to Oakland and that views from the bridge in the eastbound direction should consider Oakland's central business district and waterfront. The Bay Conservation and Development Commission's (BCDC) Design Review Board also supports the "gateway" concept. A permit from BCDC will be required for a new bridge. One of the design recommendations approved by MTC was that a new east span should not be double-decked, but rather have a single deck or parallel separated decks. This would provide eastbound traffic with significantly improved views of Oakland and the East Bay.

Six alternatives are being studied for the Draft Environmental Impact Statement, prior to selection of a final design: the no-build alternative, retrofit of the existing structure, and a new structure on four possible alignments (two north of the existing bridge and two south of the existing bridge). The new bridge alternatives have three design variations, including a skyway design and two "signature" designs – a single-tower, cable-stayed design and a single-tower, self-anchored suspension design. Once the 30% design studies are completed this spring for the cable-stayed and suspension designs, the true costs of both "signature" bridges will be known and MTC will make a design recommendation to Caltrans. MTC has the authority for funding such an amenity by extending the $1.00 toll increase for an additional two years beyond the current eight years. You may wish to express your view on this issue to MTC.

- **Preserve the East Bay Shipping Channel**

A new bridge would provide for continued shipping access to and from the Port of Oakland on the east side of Yerba Buena Island. This was recommended by the EDAP and will be required by the United States Coast Guard as a condition of the permit they would issue for a new bridge. Retrofit of the existing bridge would require new piers under the cantilever section, which would reduce the width of the shipping channel. For all project alternatives, the shipping channel will be maintained with a minimum width of 153 meters (500 feet) and a vertical clearance of 42 meters (138 feet).

- **Allow for future light rail transit on a new bridge**

A new bridge will be designed to allow for the loads of possible future rail service, as recommended by MTC. Introduction of light rail transit on a new bridge would be a future decision, consistent with Regional Transportation Planning, and would require public and legislative support.

We appreciate your comments on this important project, and we will keep the Oakland Landmarks Preservation Advisory Board informed as the Section 106 compliance process continues. If you have any additional comments or questions regarding the Section 106 process or mitigation measures, please contact Jared Goldfine, District Branch Chief for San Francisco and Architectural History Studies, Office of Environmental Planning, South (510-286-6203). For questions about the environmental process, please contact Mara Melandry, Environmental Manager for the SFOBB (510-286-5582).

Sincerely,

HARRY Y. YAHATA
District Director

By

DENIS J. MULLIGAN
District Division Chief
Toll Bridge Program

cc: Marina Carlson, Office of Mayor Elihu Harris
Jeff Eichenfeld, California Preservation Foundation
Oakland Heritage Alliance
Andrew Altman, CEDA, Chief of Planning
Charles Bryant , CEDA, Zoning Division
Willie Yee, CEDA, Zoning Division
Terry Roberts, Director, PWA
John Schultz, FHWA
Cherilyn Widell, SHPO

OFFICE OF THE MAYOR
SAN FRANCISCO

WILLIE LEWIS BROWN, JR.

May 13, 1998

The Honorable Mary V. King
Chair, MTC Bay Bridge Design Task Force
101 Eighth Street
Oakland, CA 94607-4700

Dear Supervisor King,

I am writing at this time in regard to your pending decision on funding of Bay Bridge project elements, and specifically, to clarify San Francisco's position and intentions with respect to a very important element, the Transbay Transit Terminal replacement.

As you may recall, in late 1997, San Francisco's on-going environmental work on a replacement terminal and the future of land use and development in the Transbay area were suspended due to my concerns about the level of support for the proposed new terminal. Although formally endorsed by the San Francisco Board of Supervisors, the lack of clear support on the part of Caltrans and MTC for San Francisco's work on this important regional transportation project led me to question the value of our endeavor.

Recently, both MTC and Caltrans officials have assured me that they support San Francisco's policy to replace the oversized, unfriendly, and unsound Transbay Transit Terminal with a modern, efficient facility which will welcome increasing numbers of riders for decades to come. Given that assurance, San Francisco has decided to move forward once again with this project and will reinitiate the planning and environmental efforts to build a new terminal at the selected site of Howard and Main and Beale Streets. We will continue to work closely with all responsible agencies and parties to bring this important project to fruition.

Solid land use and transportation planning considerations led San Francisco, working for more than a year through an inter-agency effort, to site the new terminal at the selected location. One of the most important of these considerations is the ability to minimize the impact of building a new terminal on AC Transit's daily operations. Construction of a new terminal at the Howard Street site, coupled with Caltrans' plans to modify the existing terminal for interim operations, will mean that AC Transit's operations will continue to provide quality service to and from San Francisco with little or no operational difficulties. When the new terminal is completed and is linked to the new Terminal Separator Replacement and Bay Bridge via exclusive bus lanes, AC Transit will be able to relocate its operations from the dreary environment of the existing terminal to a bright and hospitable new terminal.

401 VAN NESS AVENUE, ROOM 336, SAN FRANCISCO, CALIFORNIA 94102
(415) 554-6141
RECYCLED PAPER

OFFICE OF THE MAYOR
SAN FRANCISCO

WILLIE LEWIS BROWN, JR.

As you know, the Transbay Transit Terminal replacement is on the list of Bay Bridge project elements to be funded with surplus toll revenue. San Francisco needs the assistance and support of your Task Force to assure that a substantial commitment of funds for a new terminal are provided. The City, working closely with AC Transit, MTC, Caltrans, and other regional transit providers, will now continue to move forward to develop a financing plan, appropriate environmental documentation, and an operating proposal for the new terminal.

With your help, I am confident that we can replace the Transbay Transit Terminal with a new facility which the region will point to with pride. Those who ride transit across the Bay, and to and from other regional locations, certainly deserve a better terminal. I am prepared to work with you and other East Bay leaders to make a new terminal a reality. Thank you for your regional leadership on the critical Bay Bridge needs and for your consideration of San Francisco's views regarding the Transbay Transit Terminal element.

Sincerely,

Willie L. Brown, Jr.
Mayor

401 VAN NESS AVENUE, ROOM 336, SAN FRANCISCO, CALIFORNIA 94102
(415) 554-6141

RECYCLED PAPER

DREYNOLDS, CSTREETER, TMcDONNELL, JMcCRANK

From: Denis J. Mulligan

Congress of the United States

Washington, DC 20515

June 11, 1998

Jim Spering
Chairman
Metropolitan Transportation Commission
Joseph P. Bort MetroCenter
101 Eighth Street
Oakland, CA 94607-4700

Dear Mr. Spering,

We are writing to encourage the Metropolitan Transportation Commission to follow the recommendation of its architectural advisory panel to incorporate bicycle-access lanes into designs of the replacement east span of the Bay Bridge during its meeting this month. We believe it will be a progressive decision that will benefit generations of Bay Area residents.

Bicycle lanes on the new east span will be the first step toward linking the East Bay and San Francisco by popular alternative transportation, while providing an exciting new recreation for visitors and weekend travelers. In a recent informal San Francisco Chronicle poll, respondents voted at a seven to one margin in support of bicycle and pedestrian access to the bridge. The Golden Gate Bridge is already a popular conduit for bicyclists, who often number more than 3,000 on weekends. The East Shore bicycle path from Albany to the Bay Bridge is currently under construction. The eventual possibility of biking from Oakland into The City will take some drivers off of our congested freeways, encourage the development of recreational open space on Treasure Island, and afford the public views of the entire region from the middle of the Bay that are not possible by car today.

While the west span and approach of the Bay Bridge are being retrofitted without bicycle lanes, bikes on the east span encourage that option — a decision MTC alone can make. While Mayor Willie Brown has discouraged public access to Yerba Buena and Treasure islands, bicycle lanes on the bridge will encourage The City's redevelopment authority to preserve open spaces and make them available to the public.

Bicycles on the new bridge will constitute one enormous step toward connecting the Bay Area as never before. The advisory panel voted 13 to 1 for a bicycle and pedestrian lane. We earnestly hope you will choose their counsel as you meet this month.

Sincerely,

GEORGE MILLER, M.C. NANCY PELOSI, M.C. ANNA ESHOO, M.C.

BARBARA LEE, M.C.

TOM LANTOS, M.C.

LYNN WOOLSEY, M.C.

PETE STARK, M.C.

ELLEN TAUSCHER, M.C.

TOM CAMPBELL, M.C.

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY

PETE WILSON, *Governor*

DEPARTMENT OF TRANSPORTATION

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

June 12, 1998

Mr. Steve McAdam
Bay Conservation and Development Commission
30 Van Ness Avenue, Room 2011
San Francisco, California 94102

Ala/SF 80
EA 012000
East Span Seismic
Safety Project

Dear Mr. McAdam,

Thank you for participating in our meeting on June 2, 1998 regarding the co-ordination of the potential development of a park in the vicinity of the east approach to the San Francisco Oakland Bay Bridge. We appreciate your ideas and contributions to making the area a future recreational and visual resource for Bay Area residents.

We noted the opinions you expressed regarding the need for construction of good roadway access to such a park and that roadway access to such a park would be considered a public access improvement by BCDC staff. We certainly concur.

If you have any questions, please call Mara Melandry, Environmental Manager for the San Francisco-Oakland Bay Bridge at 510-286-5582.

Sincerely,

HARRY Y. YAHATA
DISTRICT DIRECTOR

By Denis Mulligan

DENIS J. MULLIGAN
DISTRICT DIVISION
TOLL BRIDGE PROGRAM

OFFICE OF THE MAYOR
SAN FRANCISCO

WILLIE LEWIS BROWN, JR.

June 22, 1998

The Honorable Mary King
Chair, MTC Bay Bridge Design Task Force
101 Eighth Street
Oakland, CA 94607-4700

Dear Supervisor King:

I am writing at this time to support a request by my East Bay colleagues to postpone the vote on the Bay Bridge replacement project pending further discussion and review. There is no need to rush into a final decision as the current East Span is presently in the process of being retrofitted prior to its replacement. Careful and thoughtful consideration should be given by the region in order to build a new Bay Bridge that will accommodate the needs of the citizenry well into the 22nd century. With an estimated cost of $1.5 billion, the job must be done right the first time and must take into account the concerns of the region as a whole.

Specifically, I am concerned about the future development of Treasure Island and Yerba Buena Island and the impact the currently proposed design will have on the Treasure Island reuse plan adopted in July of 1996. The most recent plans presented by Caltrans significantly impact San Francisco's ability to make the Treasure Island Project financially self-sustaining and have adverse environmental and historic preservation consequences. In addition to these concerns, I also believe that further studies should be done with respect to rail and bike and pedestrian access.

Accordingly, I ask that we defer the decision on the Bay Bridge replacement project as well as issues such as the Transbay Terminal until regional consensus is reached. Let us work together on the most important regional transportation undertaking of the century and build a bridge that will meet the needs of the entire region and be cherished for generations to come.

Thank you for your leadership and for your consideration of San Francisco's tremendous concerns regarding the Bay Bridge replacement project.

Sincerely,

Willie L. Brown, Jr.
Mayor

401 VAN NESS AVENUE, ROOM 336, SAN FRANCISCO, CALIFORNIA 94102
(415) 554-6141
RECYCLED PAPER

DEPARTMENT OF THE NAVY
ENGINEERING FIELD ACTIVITY, WEST
NAVAL FACILITIES ENGINEERING COMMAND
900 COMMODORE DRIVE
SAN BRUNO, CALIFORNIA 94066-2402

IN REPLY REFER TO:

11011
Ser 62B/L8197-2
Yerba Buena Island
Former NAVSTA TI
16 July 1998

Mr. Nick Fiorentinos
Right of Way Agent
State of California
Department of Transportation
Box 23440
Oakland, CA 94623-0440

Dear Mr. Fiorentinos:

This letter is in response to your correspondence of July 1, 1998 in which you request the Navy to issue a license for access to Yerba Buena Island to perform drilling for geologic investigations for your proposed N6 alignment and two possible detour routes for the new east span of the San Francisco Bay/Oakland Bay Bridge starting 01 August 1998.

Based on the environmental checklist you provided to us in your letter, there is insufficient documentation for us to be able to adequately evaluate the environmental effect of the proposed action or accept your conclusions from an environmental compliance perspective. As I discussed with you in our telephone call on 14 July 1998, in order for us to approve the proposed action, the Navy must first document compliance with applicable environmental laws and regulations. To expedite this process, we propose that you work with our environmental planning staff to prepare such documentation to appropriate standards.

The principal requirement is for a completed National Environmental Policy Act (NEPA) document. The NEPA document should demonstrate and justify a lack of significant resulting impacts to historical and archeological resources, noise, traffic and access, visual/aesthetics, air quality, water quality, grading, erosion, runoff, landscaping, hazardous materials management, the Navy's Installation Restoration hazardous wastes cleanup program, groundwater and aquifers, land use, and biological resources including endangered species.

The NEPA document needs to demonstrate parallel interagency coordination and completed compliance with (a) Section 106 of the National Historic Preservation Act (NHPA) for the highly sensitive historical and archeological resources that could be adversely affected by the drilling program; (b) the Endangered Species Act to assure no rare, threatened or endangered species would be affected; (c) the Clean Water Act

including such possible permits as Section 404, Section 401, NPDES, and Stormwater Management; (d) the Clean Air Act including Conformity calculations; (e) the Coastal Zone Management Act for coastal zone concerns if any; and (f) Executive Order 12898 on Environmental Justice. It also needs to demonstrate parallel interagency coordination with our ongoing Installation Restoration Program at the base.

Our preliminary review finds that the proposed action is likely to have an adverse effect on cultural resources, that our Installation Restoration Program will be significantly impacted and that the proposed action may potentially be controversial. Therefore, we anticipate that an Environmental Assessment (EA) will be necessary for environmental planning and documentation purposes.

If you have completed California Environmental Quality Act documentation for this proposed action, such documentation would be useful in preparing the NEPA documentation. I would estimate that EA preparation may be completed in about one month, but the consultation requirements under the NHPA may take longer.

As we also agreed in our telephone conversation, a meeting of our offices should be scheduled as soon as possible to facilitate completion of this effort. Based on the availability of Navy staff, I propose we meet on 21 July 1998 at 1:00 PM in our San Bruno offices. If this is inconvenient, we can schedule another date. I may be reached at (650) 244-3004. My pager number is (650) 869-7945.

Sincerely,

Kenn Parsons
Base Conversion Manager
Former Naval Station Treasure Island

Distribution:
Mara Melandry, CALTRANS
Annemarie Conroy, City of San Francisco

PORT OF OAKLAND

VIA FAX
650-755-1370

August 10, 1998

Mr. Jon Rubin
Bay Relations, Inc.
2171 Junipero Serra Blvd. Suite 280
Daly City, California 94014

Re: San Francisco - Oakland Bay Bridge:
Impacts of Southern Alignment on Port of Oakland Expansion

Dear Mr. Rubin;

As you requested, I have quantified and summarized the potential impacts of the so-called 'Southern Alignment' of the eastern span of the Bay Bridge. They are attached.

In addition to the economic considerations, please note the following:

The so-called "Bay Bridge Terminal" is the last site at the Port of Oakland which is capable of being developed into major container terminal. Although not anticipated to be constructed until 2010 or beyond, it is designated in the *San Francisco Bay Area Seaport Plan* as a preferred terminal site to satisfy long-term regional needs. Given the stringent fill requirements imposed by BCDC, the significance of this designation cannot be overstated. In addition, the elimination in the Seaport Plan of approximately 200 acres of 'Port Priority Use' area to accommodate alternative redevelopment opportunities in Alameda makes it even more imperative to secure as much potential terminal space at the Port of Oakland.

For these reasons, the site is considered to be one of the most important strategic assets in the Port's inventory of expansion opportunities. Loss of use of even a portion of the site represents an 'opportunity cost' of major proportions.

530 Water Street ■ Jack London Square ■ P.O. Box 2064 ■ Oakland, California 94604-2064
Telephone (510) 272-1100 ■ Fax (510) 272-1172 ■ TDD (510) 763-5703 ■ Cable address, PORTOFOAK, Oakland

In addition to the Port's needs, there are several projects underway or in planning stages, which would be adversely affected by the southern alignment. These include Caltrans' plans to provide for public access to the end of the 'spit', a mitigation commitment associated with the reconstruction of the Cypress Freeway. To date this project has been unquantified. I assume that MTC or Caltrans would account for the impacts of the southern alignment on the mitigation project when the preferred alignment alternative is finalized.

Additionally, the Port is currently working with Caltrans, the East Bay Regional Park District, and the City of Oakland to develop a suitable gateway image to the East Bay, by consolidating land holdings on the southern edge of the spit peninsula, and converting the 16+ resultant acres into a recreational opportunity. Preliminary estimates of the cost of this project are $5,000,000 to $7,000,000. The southern alignment will eliminate our ability to facilitate the development of the park. This issue is a very sensitive in the West Oakland community.

As I mentioned on the phone this morning, the material presented here requires some explanantion of the assumptions and methodologies employed. I will be happy to go over it with you, at your convenience. Please give me a call today at 510-272-1579.

Sincerely,

Richard J. Wiederhorn
Planning Manager

cc: Supervisor Mary King
Bill Hein, MTC
Charles W. Foster, Port of Oakland
Ray Boyle, Port of Oakland

August 10, 1998

SAN FRANCISCO - OAKLAND BAY BRIDGE SOUTHERN ALIGNMENT

Summary: Estimated Impact on Port of Oakland Proposed Bay Bridge MarineTerminal

A. San Francisco Bay Area Seaport Plan (BCDC and MTC, updated February 1996):
Attachment A - Port of Oakland:

Current: 802 Acres Container Terminals
31 Acres Break Bulk Terminal (Burma Road Terminal, adjacent to proposed Bay Bridge Terminal)
60 Acres Dry Bulk Terminal (Schnitzer Steel)

893 Acres + Associated Port Priority Use Area

Proposed: Bay Bridge Container Terminal: 100-Acre Container Terminal Expansion

Total = 902 Acres Container Terminal = 12.5% Port Terminal Acres Expansion

Additional Considerations:

"Loss" of 200+ Designated Port Priority Use Area @ NAS Alameda
= Extra Pressure to Expand Oakland Terminals over Long Term

B. Bay Bridge Terminal

Anticipated construction start 2015

Est. Total Construction Cost (2015 $):	$281.3 Million
Est. Total Mitigation Cost	$ 70.3 Million
Est. Project Cost	$351.6 Million

Est. Annual Revenue Requirements:	$45.0 Million
Est Loss of Revenue Due to South Alignment	$ 6.7 Million Annually
Est. 30-Yr. Revenue Loss @ NPV:	$81.7 Million

VS. $1.5M @ 4% per annum

Port of Oakland - "New" Bay Bridge Terminal

Estimated Construction Costs - Calender Year 2015

Project	Quantities		Rate	Cost	
INFRASTRUCTURE					
Dikes (3)	6,100	feet	$ 4,000	$ 24,400,000	
Fill - 100acres (30 ft)	6,500,000	cu. yds.	$ 8.00	$ 52,000,000	
subtotal				$ 76,400,000	
Eng & OH			20%	$ 15,300,000	
Total Infrastructure Costs					$ 91,700,000
TERMINAL					
Wharf	2,400	feet	$ 20,000	$ 48,000,000	
Container Yard	100	acres	$ 500,000	$ 50,000,000	
Cranes	6	cranes	$ 10,000,000	$ 60,000,000	
subtotal				$ 158,000,000	
Eng & OH			20%	$ 31,600,000	
Total Terminal Costs					$ 189,600,000
Total Construction Costs					$ 281,300,000
MITIGATION					
Estimated Cost			25%		$ 70,300,000
Total Project Costs					$ 351,600,000

Port of Oakland - "New" Bay Bridge Terminal

Projected Revenue - Beginning Calendar Year 2017

Annual Revenue Needs				
Total Project Cost	$ 351,600,000			
Acreage		100		
Square Feet		4,356,000		
Bond Funding Rate			5.50%	
Coverage Rate			60.00%	
Land Value / Sq. Ft.				$ 15.00
Return on Land				10.00%
Funding Costs		Factor	Amount	
Debt Service		0.06844	$ 24,063,504	
Coverage		0.041064	$ 14,438,102	
Total Debt Service				$ 38,501,606
Land Value	Land Value		Return	
Market	$ 15.00	$ 65,340,000	10.00%	$ 6,534,000
Total Annual Revenue Needs				$ 45,035,606
New" Bay Bridge Terminal				
Minimum Annual Revenue Guarantee				$ 45,035,606
Annual Loss of Revenue			15.00%	$ 6,755,341
30 Year Revenue Loss @ NPV				$ 51,790,947
Years & NPV Rate		30	7.25%	

Sheet2 NBBT-CST.XLS
8/7/98
2:27 PM

DRAFT

SAN FRANCISCO BAY AREA SEAPORT PLAN

A REPORT TO THE

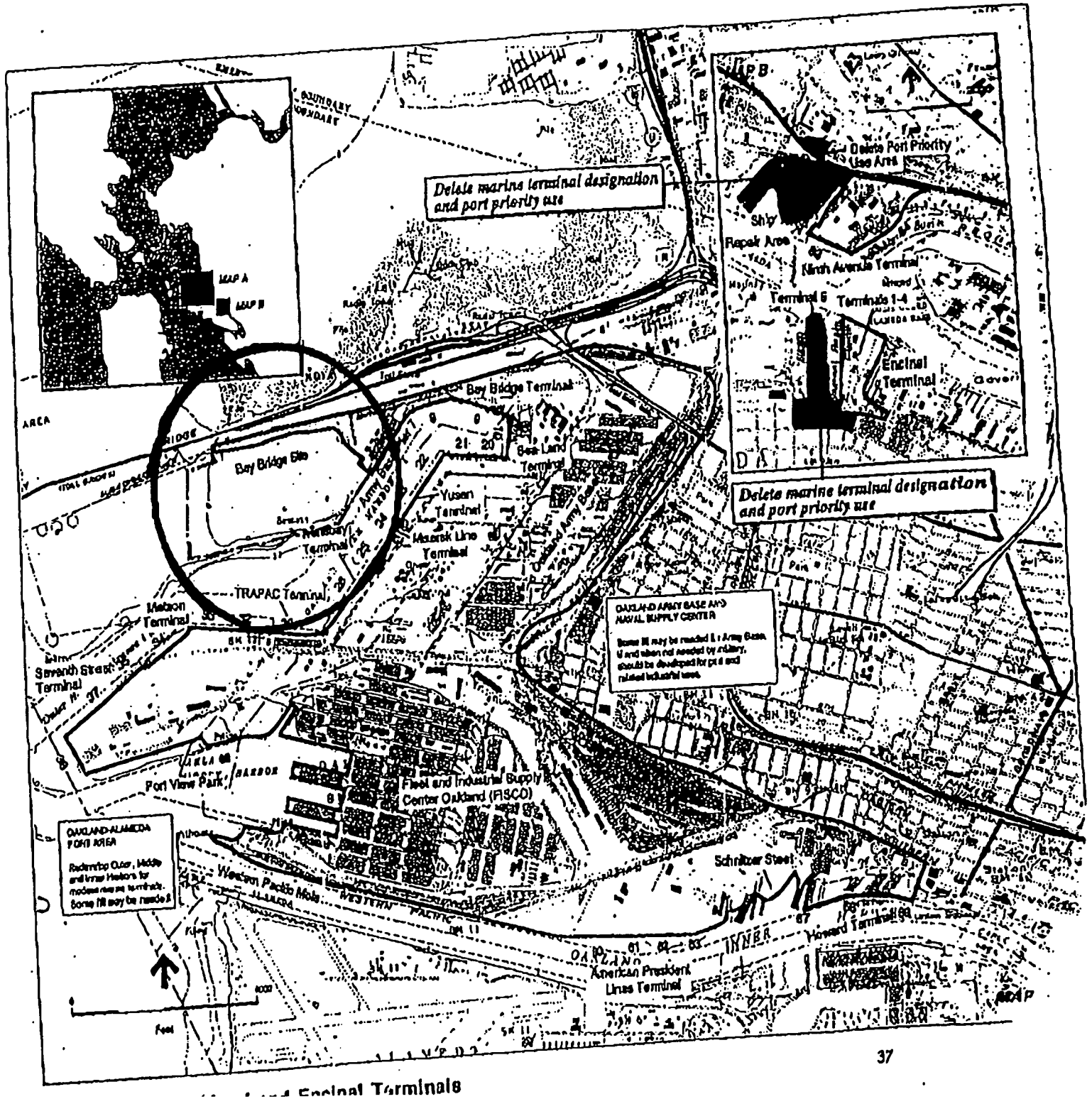
SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION

AND THE

METROPOLITAN TRANSPORTATION COMMISSION

FEBRUARY 1996

SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION
Thirty Van Ness Avenue • Suite 2011 • San Francisco, California 94102 • (415) 557-3686

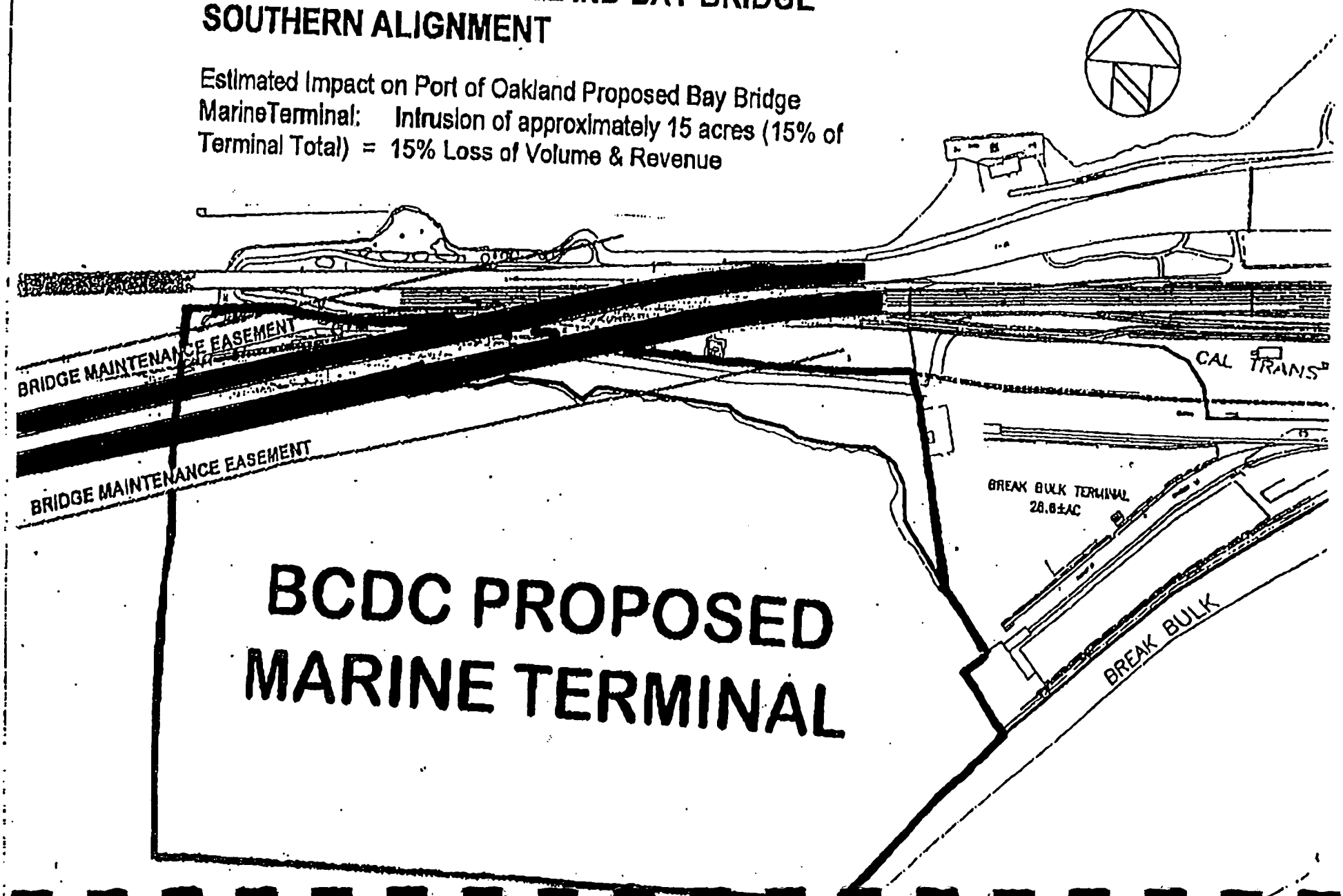


Encinal Terminals

28-AUG-98 14:00 FROM:MAL ID:510 464 7782 PAGE 9/10

SAN FRANCISCO - OAKLAND BAY BRIDGE SOUTHERN ALIGNMENT

Estimated Impact on Port of Oakland Proposed Bay Bridge MarineTerminal: Intrusion of approximately 15 acres (15% of Terminal Total) = 15% Loss of Volume & Revenue



Dahms / Hein / Remington for Response

SACRAMENTO ADDRESS
STATE CAPITOL, ROOM 2057
SACRAMENTO, CA 95814
(916) 445-0503

E-MAIL: SENATOR.KOPP@SEN.CA.GOV

DISTRICT OFFICE
2171 JUNIPERO SERRA BLVD.,
SUITE 530
DALY CITY, CA 94014-1980
(650) 301-1721

California State Senate

STATE SENATOR
QUENTIN L. KOPP
EIGHTH SENATORIAL DISTRICT
REPRESENTING SAN FRANCISCO AND SAN MATEO COUNTIES

STANDING COMMITTEES:
TRANSPORTATION - CHAIRMAN
AGRICULTURE & WATER RESOURCES
BUDGET AND FISCAL REVIEW
FINANCE, INVESTMENT & INTERNATIONAL TRADE
HOUSING AND LAND USE
LOCAL GOVERNMENT
PUBLIC SAFETY
REVENUE AND TAXATION

SELECT COMMITTEES
PROCUREMENT, EXPENDITURES AND INFORMATION TECHNOLOGY - CHAIRMAN
ALAMEDA CORRIDOR
GENETICS & PUBLIC POLICY
HIGHER EDUCATION
PRISON MANAGEMENT
TECHNOLOGICAL CRIME AND THE CONSUMER
REDEVELOPMENT

SUBCOMMITTEES
BUDGET SUBCOMMITTEE NO. 2 ON RESOURCES, ENVIRONMENTAL PROTECTION, JUDICIARY AND TRANSPORTATION - CHAIRMAN
FINANCE SUBCOMMITTEE ON CALIFORNIA-EUROPEAN TRADE DEVELOPMENT - CHAIRMAN

JOINT COMMITTEES
JOINT COMMITTEE ON LEGISLATIVE AUDIT
JOINT COMMITTEE ON RULES

August 10, 1998

Mr. Larry Dahms
Executive Director
Metropolitan Transportation Commission
101 Eight Street
Oakland, CA 94607

Dear Larry:

As you know, the mayors of San Francisco, Oakland, Berkeley and Emeryville are attempting to delay the Bay Bridge seismic safety replacement project by requesting a redesign of the bridge to include light or heavy rail tracks in lieu of several traffic lanes. I would appreciate estimates on the following factors related to such proposal:

1. The time delay and related safety risk associated with a redesign of the currently accepted Bay Bridge replacement project, including time for necessary reviews, public hearings, and reengineering.
2. The estimated cost associated with building a light or heavy rail line on the Bay Bridge and the corresponding connector lines to ensure a viable transit service.
3. The source of funds for the costs noted above and the impact of the use of such funds on other transportation projects slated for the Bay Area.
4. The impact on transbay congestion of eliminating two traffic lanes for the provision of light or heavy rail tracks during peak hours, off-peak hours and weekends.
5. The ridership estimates for new riders who would use a light or heavy rail service across the Bay Bridge to San Francisco in the west and the Union Pacific railway tracks to Sacramento in the east, or any other currently proposed transit juncture in the East Bay, as well as an estimate of the ridership reduction on existing transit service.

Thank you for your time and attention.

Sincerely yours,

Quentin L. Kopp

QUENTIN L. KOPP

QLK:jkl

11

U.S. Department of Transportation
United States Coast Guard

Commander (Pow-2)
Eleventh Coast Guard District

Bldg. 50-6
Coast Guard Island
Alameda, CA 94501-5100
Phone: (510)437-3514
FAX: (510)437-5836

16591
San Francisco Bay (8.9)
Ser: Pow 541-98
August 12, 1998

CalTrans District 04, ATTN: Ms. Mara Melandry
District Branch Chief, Environmental Review Alameda I
Box 23660
Oakland, CA 94623-0660

Dear Ms. Melandry:

Please reference your e-mails of August 11 and 12, 1998 to Mr. Jerry Olmes of my staff regarding Coast Guard policy concerning bridge removal. The Coast Guard Bridge Administration Manual, Commandant Instruction M16590.5A, requires that temporary structures (e.g. falsework, work trestles) be removed in their entirety. It also requires that any part of bridges which are replaced (except those parts incorporated in the new bridge) be removed down to the natural bottom of the waterway, or such elevation as may be required by the U.S. Army Corps of Engineers (to prevent interference with navigation improvement or flood control projects), or to an elevation deemed appropriate by the District Commander.

I recommend you ask the U.S. Army Corps of Engineers San Francisco District if they plan any projects to deepen any part of the area beneath the existing East San Francisco–Oakland Bay Bridge. Absent any additional requirements for navigation or flood control imposed by the U.S. Army Corps of Engineers, we would require removal of the existing East Bay Bridge piers to the mudline. More extensive removal in some areas could adversely impact BART's Transbay Tube.

Please do not hesitate to contact Jerry or me if we may answer any other questions. We can be reached at (510) 437-3514.

Sincerely,

W.R. TILL
Chief, Bridge Section
U.S. Coast Guard
By direction of the District Commander

Copy: U.S. Army Corps of Engineers; ATTN: Ms. Victoria Alvarez, Regulatory Branch
Coast Guard Group San Francisco, MSO San Francisco, MLCPAC(s)

STATE OF CALIFORNIA — THE RESOURCES AGENCY

PETE WILSON, Governor

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
P.O. BOX 942896
SACRAMENTO 94296-0001
(916) 653-6624
FAX: (916) 653-9824

August 13, 1998
REPLY TO: FHWA980717A

Jeffrey A. Lindley, Division Administrator
Federal Highway Administration
980 9th Street, Suite 400
SACRAMENTO CA 95814-2724

Re: Bay Bridge East Span Seismic Safety Project, San Francisco and Alameda Counties.

Dear Mr. Lindley:

Thank you for submitting to our office your July 14, 1998 letter and supporting Historic Property Survey Report (HPSR), Historic Architecture Survey Report (HASR), and Positive Archeological Survey Report (PASR) for the Bay Bridge East Span Seismic Safety Project located in San Francisco and Alameda Counties. Three alternatives are being considered by Caltrans for this project. They include:

- A no-build alternative that would maintain the structure in its current condition with no seismic strengthening;
- Retrofitting the existing structure to meet existing seismic standards;
- Replacement of the existing structure with a new bridge on a new alignment. Details of the options involving this new structure are outlined in the Project Description of the HPSR.

You are seeking our comments on your determination of the eligibility of eight pre-1948 structures and one archeological site (CA-SFr-04/H) located within the project Area of Potential Effects (APE) for inclusion on the National Register of Historic Places (NRHP) in accordance with 36 CFR 800, regulations implementing Section 106 of the National Historic Preservation Act. Our review of the submitted HPSR, HASR, and PASR leads us to concur with your determination that the following properties are eligible for inclusion on the NRHP under the following criteria as defined by 36 CFR 60.4:

- Navy Quarters 10 - Criterion C at the local level of significance.
- Navy Building 267 - Criterion C as a contributor to the Navy Quarters 10 property.

- o Bay Bridge Oakland Substation - Criterion A as a contributor to the San Francisco - Oakland Bay Bridge.

- o Key Pier Substation Oakland - Criterion A as a contributor to the San Francisco - Oakland Bay Bridge.

The aforementioned buildings have strong associations with the earliest historical period of significance for the San Francisco - Oakland Bay Bridge (1936-1948) and have retained the integrity of design and materials associated with this period.

We also concur provisionally with your determination that the remaining four pre-1948 structures listed and evaluated in the HPSR are not eligible for inclusion on the NRHP under any of the criteria established by 36 CFR 60.4. We will provide you with our final response on this issue pending receipt of information evidencing that FHWA solicited the comments of the Navy and Coast Guard on the eligibility determination made for these properties.

With regard to CA-SFr-04/H, we agree that the prehistoric component of this site may contribute to its potential eligibility under Criterion D. However, in that the site has yielded and may again yield human remains, its potential significance may extend beyond Criterion D. This should be noted in your reports and correspondence. In addition, we agree first that the historic component of the site associated with the Naval Training Station may have severely compromised integrity and secondly, that further research may be needed to address the status of the component which may be associated with the Army Post and Depot.

We would not classify the prehistoric component of this site to be potentially eligible nor characterize the Naval Training Station portion of the historic component to be ineligible. A more appropriate description would deem these components to be either contributing or non-contributing to the potential eligibilty of the site as a whole. We request that your documents reflect this characterization.

Thank you again for seeking our comments on your project. If you have any questions, please contact staff historian Clarence Caesar at (916) 653-8902.

Sincerely,

Daniel Abeyta
Deputy State Historic Preservation Officer

METROPOLITAN
TRANSPORTATION
COMMISSION

Joseph P. Bort MetroCenter
101 Eighth Street
Oakland, CA 94607-4700
Tel.: 510.464.7700
TTY/TDD: 510.464.7769
Fax: 510.464.7848
e-mail: info@mtc.ca.gov
Web site: www.mtc.ca.gov

James P. Spering, Chair
Solano County and Cities

James T. Beall Jr., Vice Chair
Santa Clara County

Keith Axtell
U.S. Department of Housing and Urban Development

Jane Baker
Cities of San Mateo County

Sharon J. Brown
Cities of Contra Costa County

Mark DeSaulnier
Contra Costa County

Dorene M. Giacopini
U.S. Department of Transportation

Mary Griffin
San Mateo County

Elihu Harris
Cities of Alameda County

Tom Hsieh
City and County of San Francisco

Mary V. King
Alameda County

Steve Kinsey
Marin County and Cities

Jean McCown
Cities of Santa Clara County

Charlotte B. Powers
Association of Bay Area Governments

Jon Rubin
San Francisco Mayor's Appointee

Angelo J. Siracusa
San Francisco Bay Conservation and Development Commission

Kathryn Winter
Napa County and Cities

Sharon Wright
Sonoma County and Cities

Harry Yahata
State Business, Transportation and Housing Agency

Lawrence D. Dahms
Executive Director

William F. Hein
Deputy Executive Director

August 17, 1998

The Honorable Quentin L. Kopp
California State Senate
State Capitol, Room 2057
Sacramento, CA 95814

Dear Senator Kopp:

In reply to your letter of August 10, 1998 requesting MTC "estimates" on the impact of instituting rail service on the Bay Bridge, most of the questions you pose are difficult to answer definitively without performing a detailed planning and engineering analysis. However, based on the information available to us at present, let me respond to your questions in the order you raised them.

1. *The time delay and related safety risk associated with a redesign of the currently accepted Bay Bridge replacement project, including time for necessary reviews, public hearings, and reengineering.*

Caltrans' current schedule calls for completion of design by July 1999, beginning construction in March 2000, and completing construction in 2004. Assuming that funds could be made available to finance any redesign of the new eastern span and existing western span to include rail service, the delays caused by additional environmental review, design work, and public hearings for incorporating light rail service on both spans of the bridge could be 18-24 months. Incorporating heavy rail service would not only entail additional environmental and public review but conceivably a different bridge type selection for the new eastern span due to the much heavier loadings. Thus, redesigning for heavy rail service could result in delays of 30-36 months.

2. *The estimated cost associated with building a light or heavy rail line on the Bay bridge and the corresponding connector lines to ensure a viable transit service.*

Light and heavy rail are two very different options. The existing bridge was designed to accommodate essentially what we could call light rail today. The new east span is being designed to accommodate similar loadings. Adding light rail to the bridge would require taking one traffic lane and one shoulder in each direction of the new span, and at least one traffic lane -- but quite possibly two traffic lanes -- in each direction through the existing tunnel and west suspension span.

According to Harre Demoro's two-volume history of the Key System trains (The Key Route: Transbay Commuting by Train and Ferry, Interurban Press, Glendale, CA, 1985), the old Key trains operated on 66 miles of track on the bridge and throughout numerous East Bay cities. At current per mile costs of building comparable light rail systems ($40-45 million per mile), the cost to

replicate the Key System would be $2.6-3.0 billion -- exclusive of modifications to the tunnel, the western span, and access facilities in San Francisco from the bridge to the Transbay Terminal (which would be substantial) and operating subsidies.

It is worth elaborating on the extensive access modifications that are not included in the above cost estimate. Access at both ends of the bridge would present a unique engineering challenge. In San Francisco, the existing highway ramps would have to be modified to carry the rail system into the Transbay Terminal. In Oakland, access would have to cross land currently designated for port use and a proposed park at the touchdown of the new eastern span.

Heavy rail is a totally different proposition. Although there is no historical precedent for heavy rail service on the bridge, the cost of instituting such service could exceed the $3 billion estimate for light rail for the following reasons. As noted above, the eastern span replacement would have to be redesigned. Two traffic lanes in each direction in the tunnel and on the existing suspension span would be required for rail service, unless the tunnel and western span were reconfigured to their pre-1958 state with rail on the lower deck and autos on the top deck -- which would restrict the auto capacity of the bridge even further.

Moreover, since the suspension span originally was designed to accommodate light rail service, it is likely that the western half of the bridge would require further strengthening to carry heavy rail loads. In the alternative, a new tunnel and bridge could be built from the island to San Francisco. Access for heavy rail in San Francisco also would be much more complicated than for light rail, and would probably require the demolition and replacement of a number of highway structures as well as substantial modifications to the Transbay Terminal itself.

3. *The source of funds for the costs noted above and the impact of the use of such funds on other transportation projects slated for the Bay Area.*

Current transportation funding sources identified in MTC's Regional Transportation Plan are not only fully subscribed for the next 20 years, but will be unable to cover $6.5 billion in costs just to operate and maintain the existing transportation system over that period. Thus, instituting rail service on the bridge would require new taxes or fees. The most likely funding source would be a further increase in bridge tolls.

The $1 seismic retrofit surcharge on all seven Bay Area state-owned toll bridges is expected to generate approximately $115 million per year; of this amount, $45 million will be generated on the Bay Bridge alone. The revenue generated by any further toll increases to finance rail service on the bridge could be reduced significantly by two factors: (1) diversion of motorists to other bridges or travel modes due to higher congestion levels caused by removing traffic lanes for rail on the Bay Bridge; and (2) the elasticity associated with higher toll levels. Ignoring these impacts for the moment,

however, we estimate that tolls would have to be raised by at least $2 on all state-owned bridges -- or by about $6 if the project were to be financed by Bay Bridge tolls alone -- to finance a $3 billion bond issue for reinstating light rail service on the bridge. The heavy rail option could entail even higher costs and higher toll levels.

4. The impact on transbay congestion of eliminating two traffic lanes for the provision of light or heavy rail tracks during peak hours, off-peak hours, and weekends.

As the question implies, instituting rail service on the Bay Bridge would require the removal of 2-4 traffic lanes on the existing western span of the bridge. This would reduce the vehicular carrying capacity of the bridge (including for buses and other high occupancy vehicles) by 20-40%. Since traffic congestion bears more of a geometric than linear relationship to capacity (i.e. small reductions in capacity can result in large increases in delay), traffic congestion would be expected to increase by considerably more than 20-40%. The increased delay could be mitigated somewhat by diversion of commuters to the new rail service or other transit alternatives in the corridor. Congestion would be worse during peak hours than during off-peak hours or weekends.

5. The ridership estimates for new riders who would use a light or heavy rail service across the Bay Bridge to San Francisco in the west and the Union Pacific railway tracks to Sacramento in the east, or any other proposed transit juncture in the East Bay, as well as an estimate of the ridership reduction on existing transit service.

We would expect modest peak period ridership on any heavy rail service that connected to the Capitols intercity service since 92% of westbound Bay Bridge auto work trips originate in Alameda and Contra Costa counties, which are served by BART and AC Transit transbay service. The Capitols primarily serve Solano, Yolo, and Sacramento county intercity trips, which comprise a tiny fraction of Bay Bridge peak traffic. If, on the other hand, the proposal were to reinstitute light rail service in the old Key System service area, such service would overlap significantly with existing BART and AC Transit service – indeed, many AC Transit transbay routes still bear the letter designations of old Key routes. In that case, Bay Bridge rail service might attract more peak period patrons, but many would likely be at the expense of BART or AC Transit.

I hope this information is responsive to your inquiry. If you need further assistance, please contact Steve Heminger of my staff at (510) 464-7810.

Sincerely,

William F. Hein
Deputy Executive Director

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION NINE
CALIFORNIA DIVISION
980 Ninth Street, Suite 400
Sacramento, CA 95814-2724

ARIZONA
CALIFORNIA
NEVADA
HAWAI'I
GUAM
AMERICAN SAMOA
N. MARIANA IS.

August 18, 1998

IN REPLY REFER TO
HA-CA
File #:04-ALA/SF-80
Document #: P19369

Mr. Harry Yahata, District Director
Caltrans, District 4
P.O. Box 23660
Oakland, CA 94623-0660

Attention: Mara Melandry

Dear Mr. Yahata:

SUBJECT: CONCURRENCE FROM SHPO ON HPSR, HASR, AND PASR FOR SFOBB

Enclosed for your use is a copy of the State Historic Preservation Officer's (SHPO) August 13, 1998, letter regarding the Historic Property Survey Report (HPSR), Historic Architecture Survey Report (HASR), and Positive Archeological Survey Report (PASR) for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project located in San Francisco and Alameda Counties.

The SHPO concurs that the following properties are eligible for inclusion on the National Register of Historic Places (NRHP) under the criteria as defined by 36 CFR 60.4: Navy Quarters 10, Navy Building 267, Bay Bridge Oakland Substation, and Key Pier Substation Oakland.

With regard to Archaeological Site (CA-SFr-04/H), the SHPO believes that the site may again yield human remains, its potential significance may extend beyond the current eligibility Criterion D. Further research may be needed to address the concerns addressed in SHPO's letter.

The SHPO also requests that the prehistoric component of the above site be appropriately described as either contributing or non-contribution to the potential eligibility of the site as a whole. Their concerns are to be reflected in the documents.

If you have any questions, please contact Bill Wong at (916)498-5042.

Sincerely,

John R Schultz

For
Jeffrey A. Lindley
Division Administrator

Enclosure

AUG 2 0 1998

STATE OF CALIFORNIA — THE RESOURCES AGENCY

PETE WILSON, Governor

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
P.O. BOX 942896
SACRAMENTO 94296-0001
(916) 653-6624
FAX: (916) 653-9824

August 21, 1998
REPLY TO: FHWA980717A

Harry Y. Yahata, District Director
California Department of Transportation
District 4
Box 23660
OAKLAND CA 94623-0660

Re: Bay Bridge East Span Seismic Safety Project, San Francisco and Alameda Counties.

Dear Mr. Yahata:

On behalf of the Federal Highway Administration (FHWA), thank you for submitting to our office your August 19, 1998 letter and supporting documentation regarding your response to comments contained in our letter of August 13, 1998 addressing the evaluation of the Bay Bridge East Span Seismic Safety project, located in San Francisco and Alameda Counties. Our letter requested additional information from FHWA and Caltrans regarding the following issues:

- information evidencing that FHWA solicited the comments of the Navy and the Coast Guard on the eligibility of four pre-1948 properties that were determined ineligible for inclusion on the National Register of Historic Places (NRHP) in the submitted Historic Property Survey Report (HPSR).

- evidence that your documentation on the National Register eligibility of the pre-historic component of CA-SFr-04/H reflects whether the components are contributing or non-contributing elements to the potential eligibility of the site as a whole.

Based on our review of the information contained in your submitted documentation, we can now conclude that FHWA and Caltrans have addressed, to our satisfaction, the issues raised in our previous letter. As such, we can now concur that the four aforementioned pre-1948 properties listed in the HPSR are ineligible for inclusion on the NRHP and that the description provided in your subsequent documentation regarding the pre-historic component of CA-SFr-04/H is an appropriate characterization of the site.

EXECUTIVE OFFICE

Thank you again for seeking our comments on you project. If you have any questions, please contact staff historian Clarence Caesar at (916) 653-8902.

Sincerely,

Daniel Abeyta
Deputy State Historic Preservation Officer

cc: Jeffrey A. Lindley, FHWA

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY PETE WILSON, *Governor*

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

September 1, 1998

Ms. Irma Lagomarsino
National Marine Fisheries Service
SW Region
501 W. Ocean Blvd. Suite 4200
Long Beach, California 90802-4213

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

Dear Ms. Lagomarsino:

This letter is to inform you of the potential for blasting to be used in the construction of replacement bridge alternatives for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project (East Span Project). Although an alternative has not been selected, the Department of Transportation (Caltrans) would like to receive your input on potential concerns associated with blasting in San Francisco Bay. We also request that you describe data requirements needed to determine if impacts would occur to harbor seals and if an incidental take permit should be pursued. Figures of the project area are attached indicating the location of the harbor seal haul-out site and the potential blasting site.

The following description of potential blasting is based on a construction contractor's review of the project's conceptual engineering.

The in-bay blasting and rock excavation would be used to create a rock bench in the sloping bedrock for a single bridge tower foundation. It would be one of the early work activities on the project and would begin within the second month after receiving a notice to proceed (currently estimated to be February 2000). The rock bench to be excavated is located at Station 57+78, approximately 80 meters northeast from the northeast end of Yerba Buena Island (see attached map). Assuming the rock bench is to be located at an elevation of -22 meters, the rock blasting would take place from -10 meters to -25 meters below water level.

The most economical and efficient method of blasting the rock would be to drill all the blast holes and set off one large explosion using millisecond delays. The rock bench is required for drilling the cast-in-drilled-holes piles. Approximately 25 footings would need to be drilled into the rock bench to support the main tower. This would require the removal of approximately 10,000 cubic meters of rock. Using an average of 7 pounds per cubic-meter of drilled rock, it is estimated that approximately 70,000 pounds of explosive would be required. The explosives that are normally used

in consolidated rock formations are water gels, which can be pumped through a square shaft that drives the drilling bit (drilling kelly bar). If this one explosion generates shock waves that are not acceptable, the area could be divided into 2 or 3 sections and then separate drilling and blasting of each section could be possible; however, this requires more time and expense. If the excavation area is divided into 2 or more sections, then the recommended procedure would be to drill, blast, and excavate the first section, before drilling the next section. This procedure would have several explosions spaced days or weeks apart, depending on the amount of time required to drill, blast, and excavate each section. The total duration of the blast would be 500 milliseconds, assuming 50 millisecond delays between drill hole rows for 10 rows. This total time would apply to one explosion or to 3 separate explosions, as the number of rows would not change. It is also recommended that all overburden, approximately 2 - 5 meters deep, be excavated down to the rock layer prior to starting the drill and blast operations.

If you have questions concerning this request, please contact me at 510/286-5582. We would be happy to arrange a field review or meeting if you so desire.

Sincerely,

HARRY Y. YAHATA
District Director

By

Mara Melandry

MARA MELANDRY
Environmental Manager, SFOBB
Toll Bridge Program

Enclosures:
Location Map
c: Becky Ota (CDFG)

STATE OF CALIFORNIA — THE RESOURCES AGENCY

PETE WILSON, Governor

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
P.O. BOX 942896
SACRAMENTO 94296-0001
(916) 653-6624
FAX: (916) 653-9824

September 10, 1998

Reply To: FHWA980717A

Jeffrey A. Lindley
Division Administrator
California Division
Federal Highway Administration
980 Ninth Street, Suite 400
Sacramento CA 95814-2724

Re: 04-SF-ALA-80; Bay Bridge East Span Seismic Safety Project

Dear Mr. Lindley:

By letter of August 6, 1998, FHWA has asked for my concurrence in its determination that the undertaking cited above will adversely affect historic properties.

I concur in this determination and recommend that FHWA consult with all appropriate parties to seek ways in which the undertaking's effects on historic properties may be avoided or reduced.

Please refer any questions you may have regarding this matter to Hans Kreutzberg.

Sincerely,

for

Daniel Abeyta
Acting State Historic Preservation Officer

APPENDIX H
NOTICE OF EXEMPTION

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. McKeta Date: 9/18/98 Title: DISTRICT DIRECTOR

Date received for filing at OPR:

APPENDIX I
RELOCATION ASSISTANCE INFORMATION

APPENDIX I
RELOCATION ASSISTANCE INFORMATION

I IMPORTANT RELOCATION ASSISTANCE INFORMATION

The following explanation is general in nature and is not intended to be a complete statement of Federal and State relocation laws and regulations. Any questions concerning relocation should be addressed to Caltrans Right-of-Way.

Any persons to be displaced will be assigned to a relocation advisor, who will work closely with each displacee in order to see that all payments and benefits are fully utilized, and that all regulations are observed, thereby avoiding the possibility of displacees jeopardizing or forfeiting any of their benefits or payments. At the time of the first written offer to purchase, owner-occupants are given a detailed explanation of the State's relocation services. Tenant occupants of properties to be acquired are contacted soon after the first written offer to purchase, and also are given a detailed explanation of the Caltrans Relocation Program. To avoid loss of possible benefits, no individual, family, business, farm, or nonprofit organization should commit to purchase or rent a replacement property without first contacting a Caltrans relocation advisor.

II RELOCATION ASSISTANCE ADVISORY SERVICES

In accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, Caltrans will provide relocation advisory assistance to any person, business, farm or nonprofit organization displaced as a result of the acquisition of real property for public use. Caltrans will assist displacees in obtaining comparable replacement housing by providing current and continuing information on the availability and prices of both houses for sale and rental units that are "decent, safe and sanitary". Nonresidential displacees will receive information on comparable properties for lease or purchase. (For business, farm, and nonprofit organization relocation services, see Section IV.)

Residential replacement dwellings will be in equal or better neighborhoods at rents or prices within the financial ability of the individuals and families displaced, and reasonably accessible to their places of employment. Before any displacement occurs, comparable replacement dwellings will be offered to displacees that are open to all persons regardless of race, color, religion, sex, national origin, and consistent with the requirements of Title VIII of the Civil Rights Act of 1968. This assistance will also include the supplying of information concerning Federal- and State-assisted housing programs and any other known services being offered by public and private agencies in the area.

Persons who are eligible for relocation payments and who are legally occupying the property required for the project will not be asked to move without first being given at least 90 days' written notice. Occupants eligible for relocation payment(s) will not be

required to move unless at least one comparable "decent, safe and sanitary" replacement residence, available on the market, is offered to them by Caltrans.

III RESIDENTIAL RELOCATION PAYMENTS PROGRAM

The Relocation Payment Program will help eligible residential occupants by paying certain costs and expenses. These costs are limited to those necessary for or incidental to the purchase or rental of the replacement dwelling and actual reasonable moving expenses to a new location within 50 miles of the displacement property. Any actual moving costs in excess of the 50 miles are the responsibility of the displacee. The Residential Relocation Program can be summarized as follows:

Moving Costs

Any displaced person, who lawfully occupied the acquired property, regardless of the length of occupancy in the property acquired, will be eligible for reimbursement of moving costs. Displacees will receive either the actual reasonable costs involved in moving themselves and personal property up to a maximum of 50 miles, or a fixed payment based on a fixed moving cost schedule.

Purchase Supplement

In addition to moving and related expense payments, fully eligible homeowners may be entitled to payments for increased costs of replacement housing.

Homeowners, who have owned and occupied their property for 180 days or more prior to the date of the first written offer to purchase the property, may qualify to receive a price differential payment and may qualify to receive reimbursement for certain non-recurring costs incidental to the purchase of the replacement property. An interest differential payment is also available if the interest rate for the loan on the replacement dwelling is higher than the loan rate on the displacement dwelling, subject to certain limitations on reimbursement based upon the replacement property interest rate. The maximum combination of these three supplemental payments that the owner-occupant can receive is $22,500. If the total entitlement (without the moving payments) is in excess of $22,500, the Last Resort Housing Program will be used. (See the explanation of the Last Resort Housing Program below.)

Rental Supplement

Tenants who have occupied the property to be acquired by Caltrans for 90 days or more and owner-occupants of 90-179 days prior to the date of the first written offer to purchase may qualify to receive a rental differential payment. This payment is made when Caltrans determines that the cost to rent a comparable "decent, safe and sanitary" replacement dwelling will be more than the present rent of the displacement dwelling. As an alternative, the tenant may qualify for a down payment benefit designed to assist in the purchase of a replacement property and the payment of certain costs incidental to the purchase, subject to certain limitations noted below under the Down Payment section. The maximum amount payable to any tenant of 90 days or more and any owner-occupant of 90-179 days, in addition to moving expenses, is $5,250. If the total entitlement for rental supplement exceeds $5,250, the Last Resort Housing Program will be used.

In addition to the occupancy requirements in order to receive any relocation benefits, the displaced person must buy or rent and occupy a "decent, safe, and sanitary" replacement dwelling within one year from the date the department takes legal possession of the property, or from the date the displacee vacates the displacement property, whichever is later.

Down Payment

The down payment option has been designed to aid owner-occupants of 90-179 days and tenants with no less than 90 days of continuous occupancy prior to Caltrans first written offer. The down payment and incidental expenses cannot exceed the maximum payment of $5,250. The one-year eligibility period in which to purchase and occupy a "decent, safe and sanitary" replacement dwelling will apply.

Last Resort Housing

Federal regulations (49 CFR 24) contain the policy and procedure for implementing the Last Resort Housing Program on Federal-aid projects. Last Resort Housing benefits are, except for the amounts of payments and the methods in making them, the same as those benefits for standard residential relocation as explained above. Last Resort Housing has been designed primarily to cover situations where a displacee cannot be relocated because of lack of available comparable replacement housing, or when the anticipated replacement housing payments exceed the $5,250 and $22,500 limits of the standard relocation procedure, because either the displacee lacks the financial ability or other valid circumstances. In certain exceptional situations, Last Resort Housing may also be used for tenants of less than 90 days.

After the first written offer to acquire the property has been made, Caltrans will, within a reasonable length of time, personally contact the displacees to gather important information, including the following:

- Preferences in area of relocation;
- Number of people to be displaced and the distribution of adults and children according to age and sex;
- Location of school and employment;
- Specific arrangements needed to accommodate any family member(s) special needs;
- Financial ability to relocate into comparable replacement dwelling which will adequately house all members of the family.

IV THE NONRESIDENTIAL RELOCATION ASSISTANCE PROGRAM

The Nonresidential Relocation Assistance Program provides assistance to businesses, farms, and nonprofit organizations in locating suitable replacement property and reimbursement for certain costs involved in relocation. The Relocation Advisory Assistance Program will provide current lists of properties offered for sale or rent, suitable for the specific relocation needs of a particular business. The types of payments available to eligible businesses, farms, and nonprofit organizations are moving and searching expenses and, possibly, re-establishment expenses or a fixed In Lieu payment instead of any moving, searching, and re-establishment expenses. The payment types can be summarized as follows:

Moving Expenses

Moving expenses may include the following actual reasonable costs:

- The moving of inventory, machinery, equipment, and similar business-related property dismantling, disconnecting, crating, packing, loading, insuring, transporting, unloading, unpacking, and reconnecting of personal property.
- Loss of tangible personal property provides payment for actual, direct loss of personal property that the owner is permitted not to move.
- Expenses related to searching for a new business site, up to $1,000 for reasonable expenses actually incurred.

Re-establishment Expenses

Re-establishment expenses related to the operation of the business at the new location, up to $10,000 for reasonable expenses actually incurred.

Fixed In Lieu Payment

A fixed payment in lieu of moving and searching payments and re-establishment payment may be available to businesses which meet certain eligibility requirements. This payment is an amount equal to the average annual net earnings for the last two taxable years prior to the relocation and may not be less than $1,000 nor more than $20,000.

V ADDITIONAL INFORMATION

Relocation Payments Not Income

Reimbursement for moving costs and replacement housing payments are not considered income for the purpose of the Internal Revenue Code of 1954, or resources for the purpose of determining the extent of eligibility of a displacee for assistance under the Social Security Act, local "Section 8" Housing programs, or other Federal assistance programs.

Right to Appeal

Any person, business, farm, or nonprofit organization which has been refused a relocation payment by the Caltrans relocation advisor or believes that the payment(s) offered by the agency are inadequate, may appeal for a special hearing of their complaint. No legal assistance is required. Information about the appeal procedure is available from the relocation advisor.

APPENDIX J
BIBLIOGRAPHY

APPENDIX J
BIBLIOGRAPHY

AGS, Inc., *Draft Semi-Annual Groundwater Monitoring and Sampling Report for October 1997 at Naval Station Treasure Island, San Francisco, California*, November 1997.

American Association of State Highway and Transportation Officials, *AASHTO Guide Specifications and Commentary for Vessel Collision Design of Highway Bridges, Volume I: Final Report*, February 1991.

APEX, *Report Site Investigation Oakland Bay Bridge, East Bay Span, Oakland, California*, March 1994,

Association of Bay Area Governments, *Bay Trail Plan*, July 1989.

Association of Bay Area Governments (ABAG), *Projections '98*, 1998.

Bay Area Air Quality Management District, *BAAQMD CEQA Guidelines - Assessing the Air Quality Impacts of Projects and Plans*, April 1996.

California Air Resources Board, *Summary of Air Quality Data for 1995, 1996, and 1997*, 1996, 1997, and 1998.

California Air Resources Board, *Proposed Amendments to the Area Designations for State Ambient Air Quality Standards, and Proposed Maps of the Area Designations for the State and National Ambient Air Quality Standards,* November 1997.

California Department of Transportation, *Energy and Transportation Systems Manual,* 1983.

California Department of Transportation, *Supplemental Biological Assessment for Interstate 80 Improvement Project High Occupancy Vehicle (HOV) Lanes San Francisco-Oakland Bay Bridge Toll Plaza,* 1990.

California Department of Transportation, *Biological Assessment for San Francisco-Oakland Bay Bridge Seismic Retrofit,* 1996.

California Department of Transportation, *Historic Architecture Survey Report and Finding of Adverse Effect*, April 1996.

California Department of Transportation, Transportation Economics Planning Program, *Retrofit vs. New Bridge, An Economic Analysis for the East Span of the San Francisco-Oakland Bay Bridge*, April 1997.

California Department of Transportation, *Historic Architecture Survey Report and Finding of Adverse Effect Addendum*, July 1997.

California Department of Transportation, *Geologic Issues for the Proposed New East Span of the San Francisco-Oakland Bay Bridge*, August 1997.

California Department of Transportation, *1996 Annual Average Daily Truck Traffic on the California State Highway System*, October 1997.

California Department of Transportation, *Air Quality Study Memorandum*, March 26, 1998.

California Department of Transportation, *Relocation Impact Report*, September 1998.

California Department of Transportation, *SFOBB East Span Seismic Safety Project 30% Type Selection Report*, May 1998.

California Office of Emergency Services, *Loma Prieta Earthquake: Homes/Businesses Damaged/ Destroyed*, December, 1989.

City of Oakland, *West Oakland Army Base Conditions and Trends Summary Report.*

City of Oakland, *City of Oakland General Plan*, June 1997.

City of Oakland, *Envision Oakland* (Draft for Public Hearings), October 1997.

City and County of San Francisco, *Treasure Island Reuse Plan, Physical Characteristics, Building and Infrastructure Conditions*, June 1995.

City and County of San Francisco, Office of Military Base Conversion, Planning Department and the San Francisco Redevelopment Agency, *Draft Naval Station Treasure Island Reuse Plan,* July 1996.

City and County of San Francisco, *Treasure Island Reuse Plan, Existing Conditions Report, Land Use and Recreational Resources*, July 1996.

Clayton Environmental Consultants, *Sediment Sampling and Analysis, San Francisco-Oakland Bay Bridge East Span, Seismic Retrofit Project*, November 1996.

Clayton Environmental Consultants, *Phase I Environmental Site Assessment, San Francisco-Oakland Bay Bridge, YBI, Parcel Acquisition Project*, December 1996.

Clayton Environmental Consultants, *Subsurface Soil Investigation San Francisco-Oakland Bay Bridge/YBI*, December 1996.

Dunphy, Dean R., Secretary, Business, Transportation and Housing Agency, Memorandum to Governor Pete Wilson re "Consideration of Replacement of the Eastern Spans of the San Francisco-Oakland Bay Bridge to Provide Seismic Safety", January 10, 1997.

Economic Development Advisory Board of the County of Alameda, *West Oakland 2000 Transportation and Economic Development Study*, 1997.

Foster Wheeler, Inc., *Basewide Environmental Baseline Survey for Oakland Army Base-Final, Oakland, California*, September 1996.

Foster Wheeler, Inc., *Basewide Preliminary Assessment/Site Inspection (PA/SI) Oakland Army Base, Oakland, California*, February 1998.

Fugro West, Inc., *SFOBB East Span Replacement N3 Alignment, Project Memorandum. Preliminary Pre-Drilling Program Status Synopsis – Extrapolated Subsurface Profile*, February 18, 1998.

Gmoser, G.J., *Archaeological Survey Report. San Francisco-Oakland Bay Bridge Seismic Retrofit 04-SF-80-P.M. 4.80/8.85, 04-ALA-80-P.M. 0.0/1.15.* Caltrans, Office of Environmental Planning South, District 4, Oakland, CA, 1995.

Holland Ph.D., Robert F., *Preliminary Descriptions of the Terrestrial Natural Communities of California.* Prepared for the State of California Department of Fish and Game, Vegetation Ecologist Nongame-Heritage Program, 1986.

Hamusek-McGann, B., M. Maniaery, and C. Baker. *Archaeological Inventory and Assessment of Naval Station Treasure Island Disposal and Reuse Project*, San Francisco, California, PAR Environmental Services, Inc. 1997.

Hice, E., and D. Schierling. *Historical Study of Yerba Buena Island, Treasure Island, and their Buildings.*, Mare Island Naval Shipyard, Base Realignment and Closure, Environmental Technical Division, 1996.

Hope, Andrew, *Findings of Adverse Effect for Seismic Retrofit Work on the West Spans and West Approach and Interim Seismic Retrofit Work on the East Spans of the San Francisco-Oakland Bay Bridge.* Caltrans, Office of Environmental Planning South, District 4, Oakland, 1997.

Josselyn, M., *The Ecology of San Francisco Bay Tidal Marshes: A Community Profile,* U.S. Fish and Wildlife Service, Division of Biological Services, 1983.

JRP Historical Consultants, *Historic Context for Evaluation Building and Structures at Treasure Island and Yerba Buena Island, Naval Station, Treasure Island, California.* On file, Environmental Department, Naval Station, Treasure Island, San Francisco, CA, 1997.

Kleinfelder, Inc., *Basewide Preliminary Assessment/Site Inspection (PA/SI), Oakland Army Base, Oakland, California, Restoration Advisory Board Summary*, February 1998

Long-Term Management Strategy (LTMS) Multi-Agency Writing Team, *Draft Long-Term Management Strategy (LTMS) for the Placement of Dredge Material in the San Francisco Bay Region.* Vol. I and II. (Report prepared for the LTMS Management Protection Agency, Region 9, USACOE, San Francisco District; San Francisco Bay Conservation and Development Commission; San Francisco Bay Regional Water Quality Control Board; and California State Water Resources Control Board), April 1996.

Metropolitian Transportation Commission, *1994 Regional Transportation Plan Final Environmental Impact Report,* June 1994.

Olivia Chen Consultants, *EBMUD Sodium Bisulfite Facilities for Main WWTP Geotechnical Findings and Foundation Recommendations*, September 1995.

Parsons Brinckerhoff, *SFOBB East Span Retrofit Project Profile Grade Analysis Technical Memorandum*, October 29, 1997.

Parsons Brinckerhoff, *Hazardous Waste Assessment*, September 1998.

Parsons Brinckerhoff, *Location Hydraulic Study*, September 1998.

Parsons Brinckerhoff, *Traffic Circulation, Access and Parking Assessment*, September 1998.

Parsons Brinckerhoff, *Bicycle and Pedestrian Access Report*, September 1998.

Parsons Brinckerhoff, *Project Alignment Alternatives*, May 1998.

PRC Environmental Management, *Groundwater Status Report: Summary of Groundwater Monitoring from November 1995 to September 1996*, May 1997.

Public Affairs Management, Inc. and Gabriel Roche, Inc., *Community Impact Assessment*, September 1998.

Public Affairs Management, Inc., *Visual Impact Assessment*, September 1998.

San Francisco Bay Conservation and Development Commission, *The San Francisco Bay Plan*, adopted 1969, amended 1987.

San Francisco Bay Conservation and Development Commission, *BCDC Permit No. 11-93* issued on June 8, 1994 (with amendments made October 19, 1994 and April 14, 1995).

San Francisco Estuary Institute, Executive Summary – Regional Monitoring Program 1996 Annual Report, 1997.

Skinner, M. and B. Pavlik, *Manual of California Vegetation*, California Native Plant Society, 1994.

Tetra Tech EM, Inc., *USCG YBI Facility, San Francisco, Underground Storage Tank Closure Report*, 1996.

U.S. Army Corps of Engineers, *San Francisco Bay, Tidal Stage vs. Frequency Study,* October 1984.

U.S. Army Corps of Engineers, *Corps of Engineers Wetlands Delineation Manual,* Technical Report Y-87-1, U.S. Army Engineer Waterways Experiments Station, 1987.

U.S. Army Corps of Engineers, *Testing Guidelines for Dredged Material Disposal at San Francisco Bay Sites, Public Notice 93-2*, February 1993.

U.S. Coast Guard, *Bridge Permit Application Guide*, 1986 as amended.

U.S. Department of Commerce, Bureau of the Census, *1990 Census.*

U.S. Geological Survey, *Probabilities of Large Earthquakes in the San Francisco Bay Region, California, U.S. Geological Survey Circular 1053,* 1990.

Western Regional Climate Center, *San Francisco, California Normals, Means, and Extremes*, data were obtained for the years 1961-1990 from the WRCC website.

Woods, Michael, *Final Species Status Plant Survey and Habitat Assessment for Naval Station Treasure Island/Yerba Buena Island, CA*, 1996.

Woodward-Clyde Consultants, *Postive Archaeological Survey Report in the Counties of San Francisco and Alameda, California, with an extended Phase I Report for Investigations at CA-SFR-04, Yerba Buena Island*, April 1998.

Woodward-Clyde Consultants, *Biological Assessment*, September 1998.

Woodward-Clyde Consultants, *Finding of Effect for Archaeological Resources Located in the City and County of San Francisco and the City of Oakland, Alameda County, California*, July 1998.

Woodward-Clyde Consultants, *Natural Environment Study*, September 1998.

Woodward-Clyde Consultants, *Noise and Vibration Study*, September 1998.

APPENDIX K
SEISMIC DESIGN

APPENDIX K
SEISMIC DESIGN

Variability of Earthquake Effects at a Given Site

It is a fundamental truth that all earthquakes of a given magnitude are not equal, particularly in the effect they have at a given location. For instance, two earthquakes of magnitude 7 could occur on the same fault. If the energy from one earthquake is propagated toward a bridge site while the energy from the other earthquake is propagated away from the bridge site, the effect of these two earthquakes at the bridge site would be very different. Yet these two earthquakes have the same magnitude.

An infinite number of earthquakes of a given magnitude could occur on a fault. To say that a bridge is designed to withstand an earthquake of magnitude 7, for instance, is therefore simplistic and can be misleading. For which magnitude 7 event is it designed? Even differing magnitudes do not adequately distinguish between earthquakes in terms of their effects at a given site. Depending on the characteristics of the individual earthquake, it is possible for a magnitude 7 earthquake to have more effect on a given bridge site than a magnitude 7-1/2 earthquake on the same fault. Current seismic design parameters address this by considering rock motions.

Rock Motions from Actual Earthquakes

Seismic events result in rock motions. Actual recorded earthquakes generate rock motions of many different frequencies. In any given earthquake the rock motions are strong for some of these frequencies and are smaller for other frequencies. The frequencies that are strong differ from earthquake to earthquake.

Design Rock Motions

Bridge design in earthquake-prone areas needs to take into account the anticipated rock motions at the bridge site. The challenge for designers is that the rock motion frequencies of future earthquakes cannot be predicted. The design rock motion is the model of anticipated rock motion that is developed for design purposes. It assumes that rock motions are strong over a broad range of frequencies, although this would never happen in a real earthquake. By assuming that rock motions are strong over a broad range of frequencies, this model takes into account the actual earthquakes that would generate strong motions for one or more of these frequencies.

Design Rock Motions for San Francisco-Oakland Bay Bridge East Span Replacement Structures

Replacement structures for the San Francisco-Oakland Bay Bridge East Span will be designed for rare seismic events. The Hayward and San Andreas faults are the dominant sources for rock motions for this bridge site, though other sources in the area have been considered in development of the bridge design. The design rock motions being used are known as the equal hazard 1,500-year return period motions. By definition, these are the motions expected to occur at the site on average once every 1,500 years. The design life of a replacement bridge is 150 years. Recognized experts in ground motion and bridge design consider the use of a 1,500-year return period to be appropriate for the purposes of bridge design. These experts include the Seismic Safety Peer Review Panel and the ground motion subcommittee of the Metropolitan Transportation Commission's Engineering and Design Advisory Panel.

The rock motions at the site are propagated up through the characterized soil at the pier locations, typically amplifying the motions. It is these motions which will be used as input into the bridge system simulations, including near field soil effects, if appropriate, in the design of replacement structures. A replacement bridge system will be designed to not only survive these motions, but also to perform to a lifeline performance level.

APPENDIX L

TITLE VI POLICY STATEMENT

STATE OF CALIFORNIA-BUSINESS, TRANSPORTATION AND HOUSING AGENCY
PETE WILSON, Governor

DEPARTMENT OF TRANSPORTATION
OFFICE OF THE DIRECTOR
1120 N STREET
P.O. BOX 942873
SACRAMENTO, CA 94273-0001
TEL (916) 654-5267
FAX (916) 654-6608

July 3, 1997

TITLE VI
POLICY STATEMENT

It is the policy of the California State Department of Transportation, in accordance with the Civil Rights Act of 1964, the Civil Rights Restoration Act of 1987, Title 49 CFR Part 21 and related statutes and regulations that no person in the State of California shall, on the grounds of race, color, sex, age, national origin, religion, or disabling condition, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity administered by the Department.

JAMES W. VAN LOBEN SELS
Director

Box 1, Folder 1

Item 1

ACCNO_000001